Redesigning Course Management Systems through Applying Andragogy and Pedagogy Learning Theory

by

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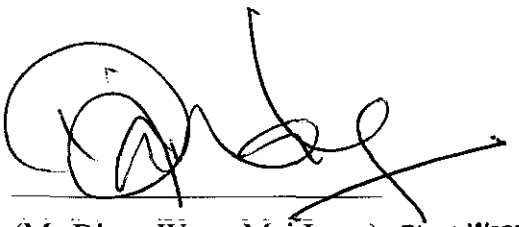

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ABSTRACT

Nowadays, students in higher educational institutions need to compete with each other to become the best among the best. In order to be the best, they need to become an excellent student in their study. The objectives of this project are to study higher education students' information seeking behavior in virtual learning environment, conduct a research to understand the principles of pedagogy and andragogy learning style and then all the information will be combined and analyzed together to redesign the Course Management System through applying the pedagogy and andragogy learning theory to make it more suitable and effective learning environment for adult learners. The design and learning principles of CMS assume pedagogical learning for all learners, including higher education students. Pedagogical learning defines instructor controlled environment. Sometimes, there are parts or situations that require andragogical concepts to make the CMS more effective. A study on technical feasibility, schedule feasibility, economic feasibility and operational feasibility has been done to determine the scope of study. This project will be using Moodle, a free and open-source e-learning software platform and the development of the system is expected to be completed within two (2) semesters. For the methodology of this project, Instructional Design (ID) will be used. It is a system approach to designing systems that meet the learners' needs. The ADDIE model for instructional design (ISD) consists of five-phase generic model which are analysis, design, development, implementation and evaluation. Each step has an outcome that feeds the next step in the sequence and one of the advantages of using ADDIE model is to ensure the effectiveness of the program using processes with specific, measurable outcomes. After a few studies have been done, the principles of andragogy and pedagogy learning style have been carried out. Pedagogy is an art of teaching children while andragogy is the style of adult learning. There are various CMS that offer various features that will support pedagogy and andragogy style. So, some of the features will be combined together to redesign the Course Management System (CMS) that support both pedagogy and andragogy learning theories.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND NOMENCLATURES

UTP	Universiti Technologi Petronas
UITM	Universiti Teknologi Mara
UM	Universiti Malaya
OUM	Open University Malaysia
FYP	Final Year project
CMS	Course Management Systems

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The use of Course Management Systems (CMS) is indisputable in most universities, colleges and distance learning institutions. CMS is predominantly used for its promulgation from teaching, learning and interactions between students and instructors. For instance, Massachusetts Institute of Technology (MIT) uses Stellar; the University of Michigan uses CHEF; and Stanford uses CourseWork. Nevertheless, common CMS used in the higher education includes Moodle, WebCT and Blackboard. The fusion of information resources consumption and technology is of equivalence to enterprise resource planning system for large organizations. More than one-quarter of all higher education classes use CMS and over 80% of learning institutions have established a single product standard for these systems [1].

The implication of CMS in rudimentary virtual learning environment has been useful, however, when applied to tertiary education, is lacking in its learning experience. Hitherto, strong emphasis has been given solely to issues of teaching and learning with technology. The design and learning principles of CMS assume pedagogical learning for all learners, including higher education students. Pedagogical learning defines instructor controlled environment. The dogmatic approach signifies instructors to mandate what to teach, how and when something will be learned. It also involves constant drilling of concepts to students through

series of lectures. According to Pew, S., [2], difficulty arises when pedagogical methods and practices are applied in whole or part to situations that require andragogical dynamics. Conventional thinking of generalizing pedagogical approach to multidisciplinary will result in unsustainable motivation for learners and undermine the entire process of student motivation [2]. The orientation toward learning requires a paradigm shifts from subject centeredness (pedagogical approach) to problem centeredness (andragogical approach) [3].

Higher education students are mature adult learners. They are perceived as problem-based learners, considering that they are generally high achievers and self motivated learners. Adult learners require freedom of choice, independent learning, practical emphasis and most importantly lifelong learning. Knowles [4] explains these characteristics as andragogical learning, 'the art and science of helping adult learn'. In Knowles research, he emphasized that adult learners accumulates a growing reservoir of knowledge. They learn effectively through experienced based techniques such as discussion or problem-solving. They are self-directed learners and are motivated to discover and apply new knowledge and skills. Knowles [4] discuss six assumptions of andragogy: learner's need to know, learner's self concept, role of the learners' experience, readiness to learn, orientation to learning and motivation to learn.

The fusion of learning theory and technology in education is nonetheless important. However, pedagogy is not always appropriate for teaching adults on the basis of crucial assumptions about learners that are different from those of child learners [4] the study emphasized on the fundamentals of human learning, viewed through two major principles of pedagogy and andragogy learning and how we can apply these learning theories into the instructional design of CMS. The study will foray the conventional CMS learning environment, from content to critical thinking and evaluation, from traditional purveyors of knowledge to facilitators of learning, finally to maximize learners' learning experience.

1.2 PROBLEM STATEMENT

It is very crucial for higher education institutional to maximize learning experience through integration of practical learning theories into technology driven solution. The difficulty exists when the pedagogy style and methods are applied in part or in whole to conditions that requires andragogy dynamic. Insufficient relevancy in these critical issues will result in temporary, situational or unsustainable motivations for adult learners. This project will carry out advantages of both pedagogy and andragogy learning style in order to redesign the Course Management System.

1.3 OBJECTIVES

- To study about higher education students information seeking behavior in virtual learning environment.
- To study about the effectiveness of pedagogy and andragogy learning style towards higher education students.
- To study and explore the whole concepts and fundamental principles of pedagogy and andragogy learning style to be used in the instructional design of CMS to redesign suitable and effective learning environment for adult learners.
- To develop an e-learning that comply both pedagogy and andragogy concepts to be used in higher learning institution.

1.4 RELEVANCY OF THE PROJECT

This project is all about to redesign the Course Management System through applying both pedagogical and andragogical learning theory. The relevancy of this project is to develop a learning environment that is suitable for adult learner. The system that will be developed will contain both pedagogy and andragogy features that will support the adults' learning.

1.5 SCOPE OF STUDY (FEASIBILITY STUDY)

1.5.1 Technical Feasibility

The proposed e-Learning can be developed using Course Management System software which is Moodle. Moodle is a free and open-source e-learning software platform, also known as a Course Management System, Learning Management System or Virtual Learning Environment. In this project also, a few web browsers will be used to find and conduct the research from the internet about the various type of learning style and other information. The examples of web browsers are Internet Explorer, Mozilla Firefox and Google Chrome. This system will have well-organized contents and features.

1.5.2 Schedule Feasibility

The development of the system is probably going to be completed within the allowed time frame, which is 2 semesters.

1.5.3 Economic Feasibility

This project will acquire a few surveys and questionnaire to get relevance data from targeted user. All the costs are not too expensive and affordable. The development tool, Moodle is a free web application that educators can use to develop desired online learning sites.

1.5.4 Operational Feasibility

After the website has been fully developed, it will be hosted on the internet and can easily be accessed from anywhere as long as the connection to the internet is available and the user has the ID number and password.

CHAPTER 2

LITERATURE REVIEW

Course Management System (CMS) have become everywhere on higher education institutional and have evolved from relatively simple HTML based one-way communication tools between faculty and students to multifunctional, some might say, enterprise level applications. CMS provides a set of tools and a framework that allows the relatively easy creation of online course content and the subsequently teaching and management of that course including various interactions with students taking the course. Information technology has been used in various forms in higher education. A CMS may contains aspect of administration such as class rosters and recording of grades but deal directly with core aspects of teaching for example learning objects, class exercises, quizzes, and tests. It also may contain tools for real-time chats or asynchronous bulletin board type communications [5].

There are many advantages of using CMS. With CMS, students and lecturer will have to spend less time on the trainees as the course creation and management is automated. The learners can go through the material any time they want and as many times they want. In the market, there are so many CMS that can be used to create effective online learning sites. For instance, MIT uses Stellar; the University of Michigan uses CHEF; and Stanford uses CourseWork. Nevertheless, common CMS used in the higher education includes Moodle, WebCT, and Blackboard. The fusion of information resources consumption and technology is of equivalence to enterprise resource planning system for large organizations. More than one-quarter of all higher

education classes use CMS, and over 80% of learning institutions have established a single product standard for these systems [1].

All those CMS offers features that can assist learning process in virtual environment to make it more effective and attractive. For example, Blackboard offers features that can reduce class time spent on adminstrivia and enhance the learning process. Moodle offers many features that support course management and WebCT can provide tools for storing and delivering course materials, tools for organizing and enhancing course material, tools for communication, tools for monitoring student progress and providing feedback, and also tools for student self-monitoring. Another CMS that are quite popular among higher educational is EduTools. It provides so many educational tools to support learning and teaching activities that can be divided into two major categories which are learners tools (communication tools, productivity tools and student involvement tools) and support tools (course delivery tools and content development tools).

The implication of CMS in rudimentary virtual learning environment has been useful, however, when applied to tertiary education, is lacking in its learning experience. The design and learning principles of CMS assume pedagogical learning for all learners, including higher education students. Pedagogy is the art of teaching children and it is frequently use in the school. The dogmatic approach signifies instructors to mandate what to teach, how and when something will be learned. Difficulty arises when pedagogical methods and practices are applied in whole or part to situations that require andragogical dynamics [2]. Andragogy is a style of learning for adult whereby they will learn something that is directly related to them easily [4]. The environment of study is more on problem-centeredness rather than subject-centeredness that is suitable for children. Because of that, a study will carried out to come out with a solution on how to develop a CMS that combines both pedagogy and andragogy learning style.

To develop an effective CMS, it is a must to study about higher education student information seeking behavior, what type of information they need, how they look for information, how they learn to solve problems and what technology will assist them. That information will be used to come out with key features of CMS that based on pedagogical and andragogical concepts. This research emphasized on the fundamental of human learning, and how we can apply these learning theories to redesign the CMS.

2.1 SECTION 1 – PRINCIPLES OF PEDAGOGY AND ANDRAGOGY LEARNING THEORIES

2.1.1 The objective of this activity is to study about various learning theories. From the studies, supporting evidence will be carried out to support the importance of the learning style (pedagogy and andragogy). Both of the learning style are really important but the difference is when the learning style should be implemented to make sure the effectiveness and efficiency of the education.

2.1.2 **Pedagogy** - The term 'pedagogy' is a learning style to teach children and more on teacher-centered model.

2.1.3 **Andragogy** - The term 'andragogy' is referring to adult learning style whereby learners or participants learn something through experiences and the subject is more on problem centeredness.

2.2 SECTION 2 - PEDAGOGY LEARNING STYLE FOR CHILDREN; ANDRAGOGY LEARNING STYLE FOR ADULTS.

2.2.1 Andragogy

According to Dr. Sandra Ratcliff Daffron on her study about andragogy learning style by Malcolm S. Knowles, she discussed in details about three (3) topics which are six (6) andragogy assumptions, andragogy process elements and the characteristics of adult learners [9]. There are six assumptions in andragogy. First, adults need to know why they need to learn something. It is because; adults tend to learn more from something that are related to their life. Second, adults are responsible for their own decisions. The learners are matured enough to think about their own decisions and they may think that they are capable to overcome any problem in the future. Third, adults have a great deal of experience to bring to education. Adults learn from experience more than reading and thus, their experience are very useful to them. Fourth, adults are ready to learn what they need to know. The readiness to learn has been developed from their life tasks and problems. Fifth, adults consider learning to be life centered. Finally, adults are mostly motivated by internal pressures because they will do something that will benefit themselves [10].

There are seven (7) process elements that can be differentiated between andragogy and pedagogy which are climate, planning, diagnosis of needs, setting of objectives, designing learning plans, learning activities and evaluation. For the first element in andragogy which is climate, the way of learning is more relax and full of trust. Each person in a group for example should have mutually respect to each other and it is more on collaborative supportive. The second one is planning. All learning materials and the flow of learning are determined by both learners and facilitator. The third and fourth elements which are diagnosis of needs and objectives setting are both determined by mutual negotiation between learners and facilitator. They can

discuss and give idea to come out with a satisfying result. And the last three elements that have been elaborated by Dr. Sandra which are designing learning plans, learning activities and evaluation are focusing more on self-directed. The learners will be given projects to be discussed together and they should come out with their own ideas. They can fully utilize the uses of internet, World Wide Web (WWW) and also can get the information from library books and also journals.

The idea of learning being facilitated rather than taught has been linked with adult education theory and practice to the notion of adults directing their own learning rather than having it directed by teachers [11]. Adult educators always try to find out the answer for the question, "How can teachers devise ways of giving students greater control over their learning. The challenge for the educator interested in promoting self-directed learning is to create spaces in which it can develop, within largely hostile environments [11]. Adult learners should have the right to negotiate with the facilitator to determine the material to be learned and how they are going to do their presentation. In this constructivist learning theory, learners assume more active and interactive roles [12]. Peer collaboration is essential to the learning process, as learners construct meaning and understanding through active participation and sharing of knowledge [12].

There are a few things in adult learner that should be considered which are personhood and characteristics of adult learner [13]. In the personhood concept, adult can be divided into two segments which are the body and the self.

The Body

Adult learners learn quite different if compared to children. They tend to use their experience to solve any problem. And they also like to solve the problems that are closely related to their own life. There has been considerable recent research about the nature of the body. From the research, it is found that human

body can be programmed by constant repetition of an action. For example, musician; they can play well the instruments without looking at it. From the research, it is suggested that older people can continue to learn both physical and mental fitness to make the learning process more attractive [13].

The Self

For adult, the self-concept is central to learning theory. One of the ways how adult learn is through communication and interaction with other people. From that, they may gain new knowledge and also learn from others experiences as well. They can use the information they get, analyze it and come out with a conclusion [13]. For example in international finance, they can read through all the current issues from newspaper or internet, and then, they can go and ask expert people to elaborate more about what is really happened. So, the main point here is, adult learn more from interaction with other people to acquire knowledge about something that are quite related to them.

For characteristics of the adult learner, there are three (3) things will be discussed which are motivation, adult learners and benefits of learning.

Motivation

Most of the adults give their maximum effort in study because of their internal incentives. They think if they study, they can acquire new knowledge and they can implement it in the real life. Motivation has been defined as the level of effort an individual is willing to expend toward the achievement of a certain goal. Motivation energizes, directs and sustains behavior and can be either extrinsic or intrinsic [2].

Adult learners

Part-time students are different from full-time students, and they form a more diverse group. They tend to be older, with the majority in their twenties and thirties. Since its foundation in 1969, the Open University has enabled many

adult learners to study part-time for a degree whilst remaining at home and continuing their employment [13].

2.2.2 Pedagogy

Pedagogy is the art and science of teaching children. There are a few assumptions about pedagogical teaching style that give the major impact on the design of the educational model. The first pedagogical assumption was the dependent personality of the learner. This implied that the learner not only did not know but could not know his or her own learning needs. The second assumption on which pedagogy was founded was that learning needed to be subjected-centered. Hence, instructional curricula were organized around subjects, such as arithmetic and geography. A third assumption emphasized extrinsic motivation as the most important driving force for learning. Therefore, learners needed to be motivated with prizes and punishment. The last foundational assumption of pedagogy was that the prior experience of the learner was irrelevant. This is the concept of the blank slate or tabula rasa. In this model, the teacher need not consider the student's prior experience as consequential [12]. In order to understand the pedagogical concepts, we must also understand the characteristics of children learners. They have very limited experience and most of their parents think that learning is compulsory. In the class, the teaching style is usually teacher-directed. Their learning syllabus typically limited to academics and the teacher often ask them to memorize instead of understanding the subject. The main focus in children learning is more likely to expect success [9].

2.3 SECTION 3 - STUDIES ON COURSE MANAGEMENT SYSTEM

2.3.1 What can CMS help in education?

Course Management System (CMS) may contain aspects of administration (class rosters, recording of grades) but also deal directly with core aspects of teaching (it may contain learning objects, class exercises, quizzes and tests). It may contain tools for real-time chats or asynchronous bulletin board type communications. The implication that CMS are as critical to the teaching and learning enterprise as ERP are to the campus administrative effort means the CMS must available 24-hours a day, seven days a week, like email and the web, because both faculty and students will be using the CMS all the times [5]. The primary users for CMS are students and lecturers. With CMS, both lecturers and students can save their valuable classroom time and improve the learning experience for the students.

2.3.2 Advantages of using CMS

Using CMS means that lecturers and learners will have to spend less time on the trainees as the course creation and management IS automated. The learners can go through the material any time they want and as many times as they want. It allows lecturers to keep a tab on every student. In case somebody is lagging behind, an instructor can personally assist that learner. Since the course in taken through the Internet, lecturers will only require a small number of instructors. These instructors can keep checking the reports and interact with students on the internet [14].

2.3.3 Orthodox thinking of pedagogical learning

Some early theorists may have indicated that, within the early childhood profession, views of learning and development included notions suggesting that young children have limited knowledge and abilities, but with age (maturation) and experience (of any kind) they become increasingly competent. However, substantial evidence of the

remarkable abilities young children do possess now stands in contrast to this older emphasis on what they lacked. It is now known that very young children are competent active agents of their own development [27]. This view challenges the notion of `readiness', and challenges the view of `waiting' for children to show interest in (for instance) literacy or numeracy, before engaging them in appropriate activities. It is now understood that there is a corresponding relationship between experience in a complex environment and structural change in the brain. The following points summarize these contemporary views, giving early childhood professionals the opportunity to refocus their endeavors.

- Development is an active process that derives essential information from experience.
- Learning changes the physical structure of the brain and organizes and reorganizes the linkages within the brain.
- These physical changes give rise to structural changes that alter the functional organization of the brain.
- Different parts of the brain will be critical for specific learning at different times.
- Some experiences have the most powerful effects during sensitive periods, while others can affect the brain over a much longer period.

There is a set of principles that underpins learning, development, and progression for all children. This is not to suggest that all children follow the same developmental pathway [28]. The research of Hill and colleagues [29] highlights how the children in their study demonstrated greater within-group differences than between, indicating the diversity of developmental pathways among young children. Because of this, the mismatch between an externally imposed curriculum and what individual children can do is not overcome by gathering together information from research reports leading to some averaged description of sequences of acquisition. Such research-based sequences are in

danger of driving the expectations of teachers while individual children are working their way forward through a variety of avenues.

2.3.4 Where it is used and how it is used?

- ✓ **Primary School & Secondary School students**

  The challenge of e-learning initially is framed for teachers to take advantage of internet revolution in human communication and resource sharing. Students today expect much more than online access to course materials. They expect online access to both academic and administrative services on the web presenting a personalized point of contact for students and instructors [26]. With CMS, management of learning will be enhanced in school.

- ✓ **Tertiary Education**

  Faculty adopt CMS principally to manage the more mundane tasks associated with teaching, especially teaching large classes. Faculty looks to CMS to help them communicate easily with students, to give students access to class documents, and for the convenience and transparency of the online gradebook [25].

- ✓ **Distance Learners**

  CMS was largely used as a useful content distribution system. Instructors can use the CMS for distributing courses and interact with students in distance. There seems to be a gap between the reality and the many advanced teaching tools that are provided in CMS, such as multimedia materials, which were considered as possible means for enhancing teaching, but not utilized. To bridge this gap CMS system should be build to be more adaptive and customizable. This is to support teachers or instructors with different computer level skills [24].

✓ **Organization**

CMS can be used for planning, delivering and managing learning events within an organization, including online, virtual classroom, and instructor-led course. For example, a CMS can simplify global certification efforts, enable entities to align learning initiatives with strategic goals, and provide a means of enterprise-level skills management. By contrast, a CMS is software for managing learning content across an organization's various training development areas [23]. It provides developers, authors, instructional designers, and subject matter experts the means to create and re-use e-learning content and reduce duplicated development efforts.

2.4 SECTION 4 – STUDIES ON VARIOUS CMS

2.4.1 Moodle

Moodle is a Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It is a free web application that educators can use to create effective online learning sites.

Moodle is an open source learning management system (LMS) that has maintained interest in the IMS-LD specifications over the past two years since community discussions began on this topic [37] [38]. At that time, it was noted that the Learning Design specification was most the most congruent standard for Moodle, due to its focus on a sequence of learning activities rather than a sequence of learning content.

Although Moodle can be used for many kinds of educational applications, it is based on socio-constructivist

principles [39] [40] and most suited for an educational approach involving interaction amongst people rather than transmission of content. In February of 2005, concurrent with the publication of the first book on Learning Design [41], the Moodle community began an online study of this book using a chapter-per-week format facilitated by ten members of the community [40]. This paper represents a summary of those discussions, and represents a view not from Moodle programmer/developers, but from the teacher/users that actively influence the application and pedagogical directions of Moodle. These values are best illustrated by one forum participant who commented, "Teachers are arrangers, not composers of good educational music". In the same way, values of flexibility and configurability will appear in this paper more than structured and systematic values of engineering perspectives. The overarching presumption we hold is that any learning design process must be intuitive and empowering for teachers, and not intended solely as the professional realm of instructional designers.

Offered educational features

Assignment Module

Assignments can be specified with a due date and a maximum grade. Lecturers can specify when to be submitted, what format, the due date etc.

Chat module

The Chat module allows smooth, synchronous text interaction. Includes profile pictures in the chat window.

Choice module

The Choice module is like a single question poll. Can either be used to vote on something, or to get feedback from every student. Students can optionally be allowed to see an up-to-date graph of results

Forum Module

Different types of forums are available, such as teacher-only, course news, open-to-all, and one-thread-per-user. There are several options for emailing forum posts to members of the course. All administration tasks can be done by lecturers to control the forum.

Glossary Module

The Glossary module is one of the modules that best illustrate the way that Moodle can fundamentally improve upon the experience of a traditional classroom. When students contribute to a course in a public place like the glossary, their ideas are given weight and attention and often result in a greater pride or ownership of the assignment.

Lesson Module

A lesson is a single activity where a series of pages are presented to the student.

Pages can allow students to make choices by their answers to questions or by selecting a button with a description. A student choice is also a link to another lesson page.

Quiz Module

Teachers can define a database of questions where they can add these questions to a course quiz or have the questions shared over the Moodle site. Quizzes are automatically graded, and can be re-graded if questions are modified.

Resource Module

Resources can display of many types of media content files by a single link on the course page.

Survey Module

Built-in surveys (COLLES, ATTLS) have been proven as instruments for analyzing online classes.

Wiki Module

Wiki module is a series of web pages that anyone can add to or edit. It enables document pages to be authored collectively and it supports group collaboration.

Workshop Module

Workshop module allows peer assessment of documents, and the teacher can manage and grade the assessment [19].

2.4.2 Blackboard

The Blackboard Learning System is a virtual learning environment and course management system developed by Blackboard Inc. Features include course management, a customizable open architecture, and a scalable design that allows for integration with student information systems and authentication protocols. It may be installed on local servers or hosted by Blackboard ASP Solutions. Its main purposes are to add online elements to courses traditionally delivered face-to-face and to develop completely online courses with few or no face-to-face meetings [35].

Students and faculty may benefit from course management systems such as the Blackboard Learning System. Potential benefits include: (1) increased availability, (2) quick feedback, (3) improved communication, (4) tracking, and (5) skill building.

Increased availability

Blackboard can be accessed from the internet at anytime and anywhere. Students can retrieve all of their course materials including assignments, lecture notes, slides, internet hyperlinks, and audio/visual aids. They can submit their assignments as soon as they are complete. It is this accessibility that most appeals to students. In a 2004 survey conducted by

Duke University, students were presented with a list of 10 Blackboard functions. The students were asked to select those functions that were most useful to them. The number one choice for 85% of students was "easy access to course materials and readings." [42] In 2005, Bowdoin College in Maine conducted a Blackboard Pilot Study of students in web-enhanced courses using Blackboard. Of the students who responded, 61% indicated that Blackboard was most helpful "in terms of increasing my access to course materials." [43] Availability is paramount for students.

Quick feedback

There are two principal types of feedback provided to students via Blackboard: faculty-initiated feedback and automated feedback. Instant grading, and therefore instant feedback, can be provided when using Blackboard's Test Manager Function for quizzes and exams. If the instructor selects the appropriate feedback options, students can take their tests and have all objective-based questions graded and scores available immediately after they submit their responses. Even if there are essay questions on tests, which must be graded individually, students can see sample answers and thus have a good idea of their outcome on the test. Students can submit their homework assignments from anywhere and see if the assignments they have submitted have been graded. Using the Blackboard Gradebook, assignments can be returned to the students and grades can be viewed confidentially. Faculty using Blackboard can also get instant feedback through the Blackboard's Survey option which allows students to respond immediately and anonymously to multiple choices or true-false questions about the class.

Improved communication

There are several features of Blackboard that allow for communications with students. Four of the more distinctive options are announcements, discussions, virtual classroom, and email. The announcement function is

available to students immediately after log on in the Blackboard system. This assures that all students are current and this minimizes administrative work for faculty. As for the discussion function, the literature indicates that asynchronous discussion within course management systems develops collegiality among students and provides a means of support for students. [44] The Blackboard option, termed Post a Question, encourages students to respond to fellow students' questions and allows instructor surveillance. The virtual classroom is a synchronous environment which supports text-based chat and allows live interaction among participants. The email option within Blackboard is very flexible. Each student's email address can be stored within the student's profile area. Blackboard provides the ability to send email to individual students, to groups of students, or to all students.

Tracking

Blackboard tracks student usage of courses and posts these results in the course statistics area. Instructors can obtain statistics on all students or individual students within the course. Individual assignments can also be tracked. Date and time stamps are included in the Last Submitted/Modified section of the submitted assignment, allowing for easy identification of late assignments. Students can also track their own progress by viewing the Gradebook.

Skill building

There are several additional skills that are promoted with the use of Blackboard. These skills include organization and time management, which go hand-in-hand in helping students carry out their assignments efficiently. Blackboard provides the ability to include a calendar for each course in which a student is enrolled, thus optimizing students' efforts to match course expectations. Current entries for each course are displayed in the Welcome area that the student sees after login. All documents posted by the instructor can provide start and end dates and times. The use of these dates

and times for all documents, including tests and assignments, encourages students to use their time wisely. Likewise, checking the Course Calendar or the Gradebook, where all assignments are listed, allows the student to allocate time efficiently.

Offered educational features

Reduce Class Time Spent on Adminstrivia

1) **Site Member Photos**

   View the students' photographs. The web page permits lecturer to sort by groups (precepts, classes, labs, etc.).

2) **Sectioning**

   Permit students to indicate section (precepts, classes, labs, etc.) preferences online, and sort them into groups that contain their e-mail lists, discussion boards, file share, and chat. Course materials and assessments can be made selectively available to these groups.

3) **E-mail**

   Keep in contact with the students either through the e-mail function within Blackboard. Lecturer also can use preferred e-mail client to send to the listserv that Blackboard populates.

4) **Grade Center**

   Calculate, store, and make students' grades available online in a secure, private environment.

5) **Web Appointment Scheduling System**

   This online system for scheduling office hours permits instructors, among other options, to create schedules. Students can also use the system to make and cancel appointments.

Enhance the Learning Process

1) **Syllabus**

   Lecturer can post the syllabus online as a living document that he/she can modify as the semester progresses.

2) **Course Materials**

   Lecturer can post lecture notes, readings, and study matter online, and have Ereserves, films, and audio files put in the site for them.

3) **Almagest**

   This powerful course management system makes it easy for lecturers to add images and other digital media to their courses and to organize them into lectures that can be present in the classroom and studied online.

4) **Assessments**

   Create online tests that students can use to practice and prepare for the real thing, or can even be the real thing. 17 question types are available. Lecturers can also use the anonymous survey tool to gather opinions and evaluate their teaching.

5) **Voice Tools**

   Lecturers can test their students verbal language skills, either asynchronously through voice discussion boards, or synchronously though live voice chat.

6) **Blogs and Wikis**

   If the lecturers have need for wikis or blogs, there are powerful and feature-rich web publishing systems, MediaWiki and Movable Type, which they can integrate into their Blackboard site. There is a link in the Course (or Organization) Tools area of the control panel, labeled Blog or Wiki that makes it easy to add a link to their course menu to the blog and wiki servers.

7) **Virtual Classroom**

   Lecturers and their students can show slides, Web pages, or draw on a white board during online office hours.

8) **Discussion Board**

Extend - or spark - classroom discussion through an option-rich, gradable, discussion board [20].

2.4.3 EduTools

Offered educational features

Learner Tools

a) **Communication Tools**

1) **Discussion Forum** - Discussion forum is a threaded online text conversation between participants.
2) **Discussion Management** - Discussion Management includes all of the accessing and scheduling associated with running a discussion forum.
3) **File Exchange** - File exchange tools allow learners to upload files from their local computers and share these files with instructors or other students in an online course. Note: File attachments to messages are part of Internal Email and Discussion Forums.
4) **Internal Email** - Internal email is electronic mail that can be read or sent from inside an online course.
5) **Online Journal/Notes** - Online Notes/Journal enable students to make notes in a personal or private journal. Students can share personal journal entries with their instructor or other students but cannot share private journal entries.
6) **Real-time Chat** - Real-time chat is a conversation between people over the Internet that involves exchanging messages back and forth at virtually the same time.
7) **Whiteboard** - Whiteboard tools include an electronic version of a dry-erase board used by instructors and learners in a virtual classroom (also called a smartboard or electronic whiteboard)

and other synchronous services such as application sharing, group browsing.

b) Productivity Tools

1) **Calendar/Progress Review** - Calendar/Progress Review tools enable students to document their plans for a course and the associated assignments in a course.
2) **Orientation/Help** - Orientation/Help tools are designed to help students learn how to use the course management system. Typically, these tools are self-paced tutorials, user manuals, and email or telephone helpdesk support.

c) Student Involvement Tools

1) **Groupwork** - Group Work is the capacity to organize a class into groups and provide group work space that enables the instructor to assign specific tasks or projects.
2) **Community Networking** - Community networking tools allow students to create social ties, study groups, clubs, or collaborative teams without instructor intervention.
3) **Student Portfolios** - Student Portfolios are areas where students can showcase their work in a course, display their personal photo, and list demographic information.

Support Tools

a) Course Delivery Tools

1) **Test Types** - Test types indicate which types of questions the software supports.
2) **Automated Testing Management** - Automated testing management includes the control of when and where tests may be taken and under what conditions.

3) **Automated Testing Support** - Automated testing support includes system services for importing and exporting tests and test banks as well as statistical analysis of test results.
4) **Online Marking Tools** - Online marking tools enable instructors and assistants to evaluate and mark student work while online.
5) **Online Gradebook** - Online gradebook includes supports for keeping track of student progress and work online in support of assigning course grades.
6) **Course Management** - Course management tools allow instructors to control the progression of an online class through the course material.
7) **Student Tracking** - Student tracking is the ability to track the usage of course materials by students, and to perform additional analysis and reporting both of aggregate and individual usage.

b) **Content Development Tools**

1) **Accessibility Compliance** - Accessibility compliance means meeting the standards that allow people with disabilities to access information online. For example, the blind use a device called a screen reader to read the screen but Web pages need to be designed so that screen readers can navigate it easily.
2) **Content Sharing/Reuse** - The product provider self-reports that the software complies with the WAI WCAG 1.0 AAA guidelines.
3) **Course Templates** - Course templates are tools that help instructors create the initial structure for an online course.
4) **Instructional Design Tools** - Instructional design tools help instructors creating learning sequences, for example, with lesson templates or wizards.

Instructional Standards Compliance - Instructional standards compliance concerns how well a product conforms to standards for sharing instructional materials with other online learning systems and other factors that may affect the decision whether to switch from this product to another [21].

2.5 SECTION 5 – E-LEARNING PRINCIPLES OF DESIGN

- **Multimedia principle**
  - People are easy to learn by using words and picture rather than using words alone.

- **Rigorous & Relevant** – ***The Content Requirement***
  - For eLearning, the content should become the highest priority to be considered about. The content of the eLearning has become the main factor to ensure the quality of the product. In some cases, the user can add the content according to the authority. Most of the eLearning give the most priority to the facilitators to upload the content while the learner just can download the content from the eLearning.

- **Teachable & Usable** – ***The Experience Requirement***
  - The features in the eLearning should be workable by the students in their classroom environment. The product should be able to serve the faculty members in the classroom so that the learner and facilitator can achieve the learning objectives successfully within the time allocated.
  - The eLearning should be able to encourage teamwork, collaboration and experimentation so that it will lead to the contribution of teaching and learning experience.
  - Usability is also very important in designing eLearning. The user interface design, human factors aspect that determine how the user

interact with the product, feedback, documentation and scaffolding that are provided to the user all contribute to eLearning usability. In order to develop an effective eLearning to user, we can use survey, questionnaire and so on. The features in the eLearning should be able to give user benefits and this can be done by surveys and so on.

- **Professional & Deliverable – *The Support Requirement***
  - The eLearning should be designed for both learners and facilitators (professionals) so that the students (learners) can use it for learning purpose and the lecturers (facilitators) can use it for delivering information.

2.6 SECTION 6 – QUESTIONNAIRE

2.6.1 Questionnaire Overview

Questionnaire is one of the methods to gather data from targeted respondents that consist of a series of related questions and other prompts.

2.6.2 Objectives of the Questionnaire

The objective of the questionnaire is to gather information from targeted respondents about their information seeking behavior and the current Course Management System (CMS). From the questionnaire, their feeling about the current CMS and how they use the features included will be tracked and analyzed. They could suggest any possible requirements to be added later on. The questionnaire also gather the data about how they find information, what type of information they usually look for and what are the study aid that will assist them to find information. The collected

information will be analyzed and the result will be used to achieve this project's objectives.

2.6.3 Target Respondents

The targeted respondents are divided into two major group which are university/college students and distance learners. Suggested universities to be observed are University Technology of Petronas (UTP), UITM Shah Alam and University of Malaya (UM). The targeted distance learners are those who are studying in Open University Malaysia (OUM) Kuala Lumpur.

Figure 2.1: Workflow for Final Year Project 1

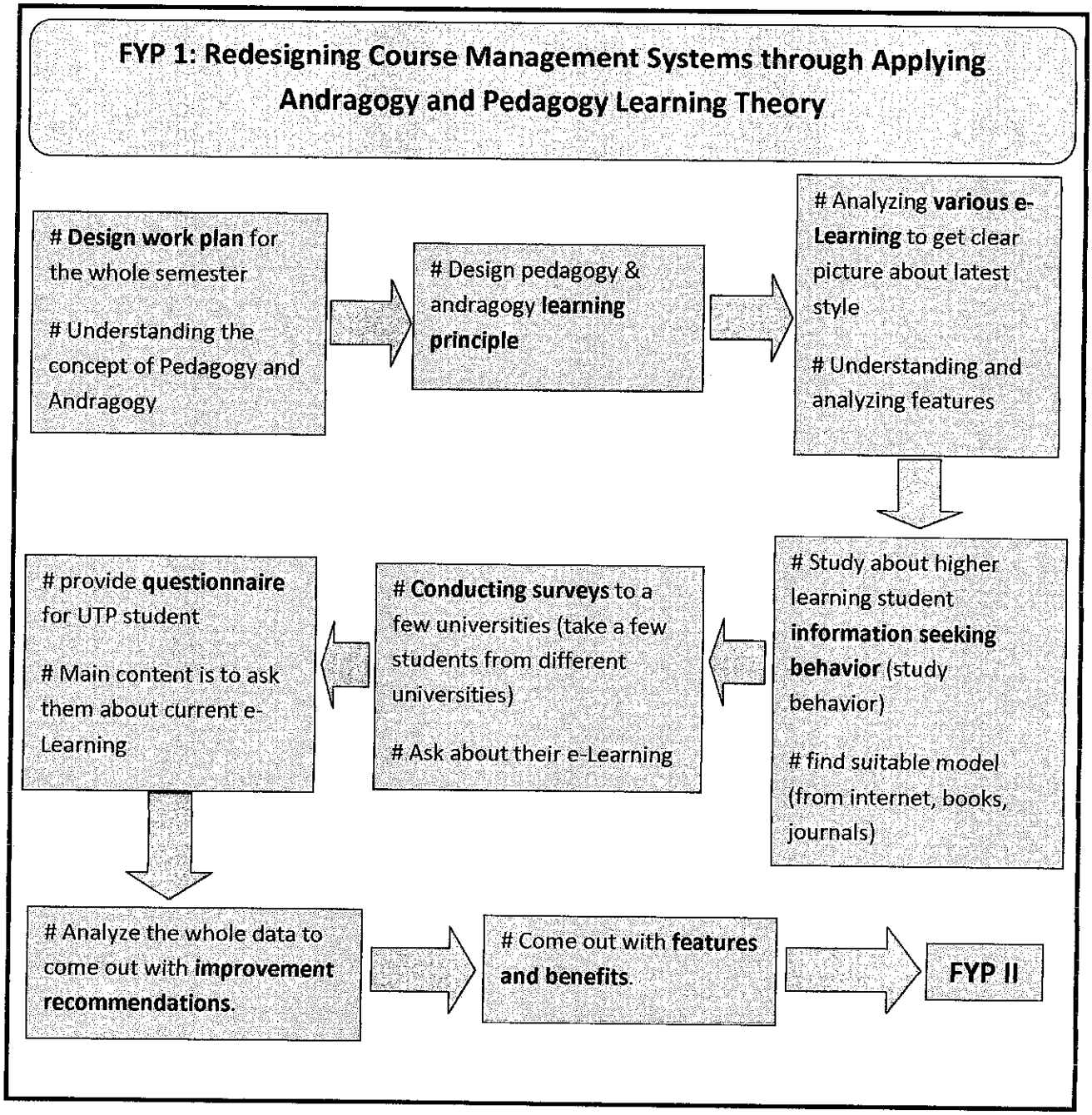
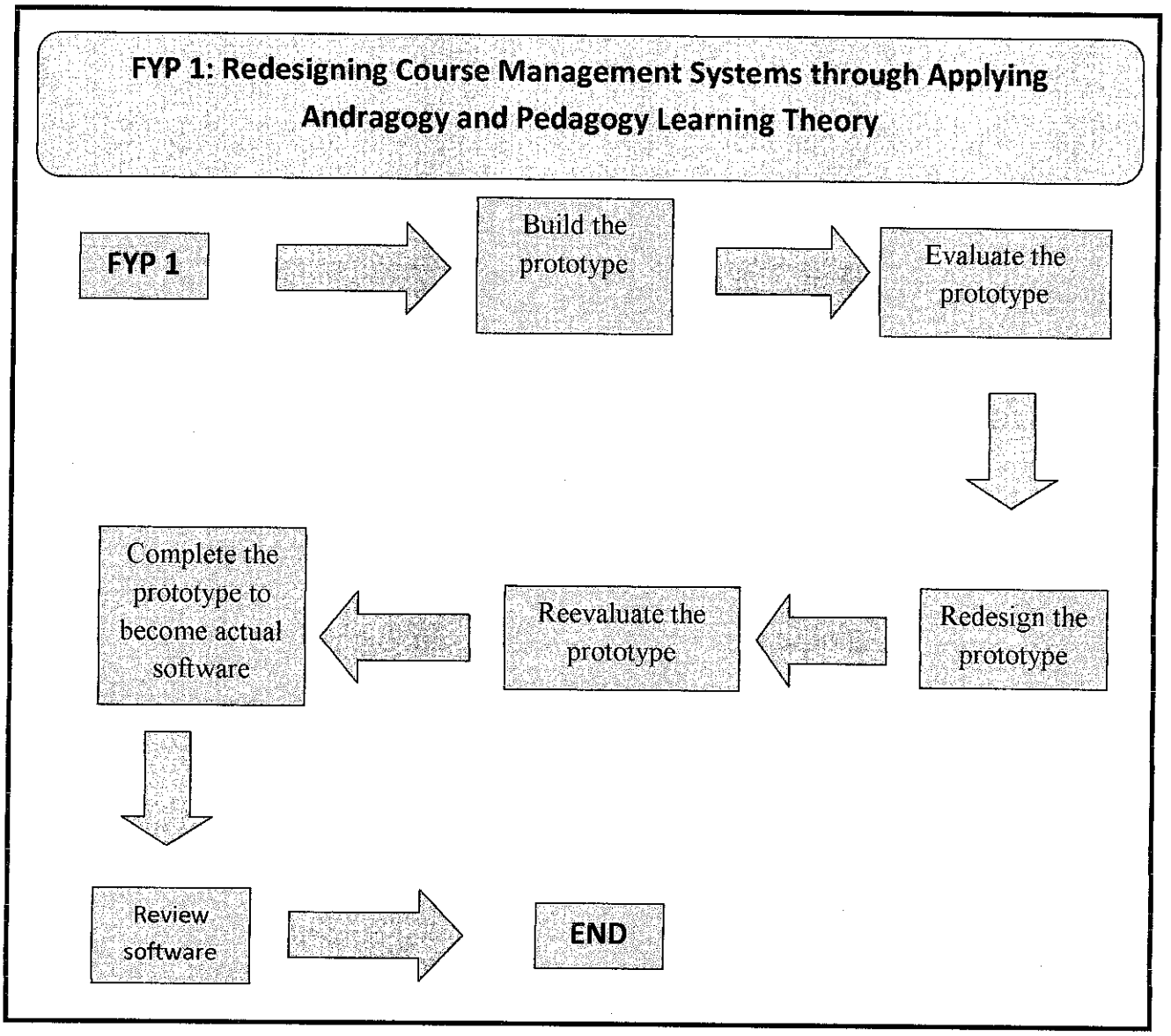


Figure 2.2: Workflow for Final Year Project 2



CHAPTER 3

METHODOLOGY/PROJECT WORK

3.1 ABOUT METHODOLOGY

For the methodology of this project, Instructional Design (ID) will be used. It is a system approach to designing systems that meet the learners' needs. The ADDIE model for instructional systems design (ISD) consists of five-phase generic model which are:

3.1.1 Analysis

In this phase, the instructional problem is explained clearly, the instructional targets and objectives are clarified and the participant's existing knowledge and skills are identified. There are a few important questions should be asked during these phases which are:-

i) Who are the targeted audience and their behavior?

ii) How to deliver the knowledge to the audience?

iii) What types of learning constraints exist?

iv) What are the new possible behavioral outcomes?

3.1.2 Design

In this phase, the selection of the features to be included in the CMS is very important. It deals with learning objectives, subject matter analysis, assessment instruments, exercises, lesson planning and type of suitable media. Below are the steps used in design process.

i) Document the project's work plan, visual and technical strategy.

ii) Apply instructional strategies according to the intended behavioral outcomes by domain (cognitive, affective, and psychomotor).

iii) Create storyboard.

iv) Design the user interface and user experience.

v) Prototype creation.

vi) Apply graphic design.

3.1.3 Development

During design phase, content assets have been developed. In this phase, the developer will gather all the assets to be created and assembled. Programmers work hard to develop and/or integrate technologies. The project then will be reviewed and revised according to any feedback given.

3.1.4 Implementation

In this phase, the training procedures for facilitators and learners have been developed according to the requirements. The training should cover all the important aspects such as the course curriculum, learning outcomes, method of delivery, and the procedure of the testing. In this phase, the web site should be functioning and all the required tools (website, ID number and password) are ready for participants to test the CMS.

3.1.5 Evaluation

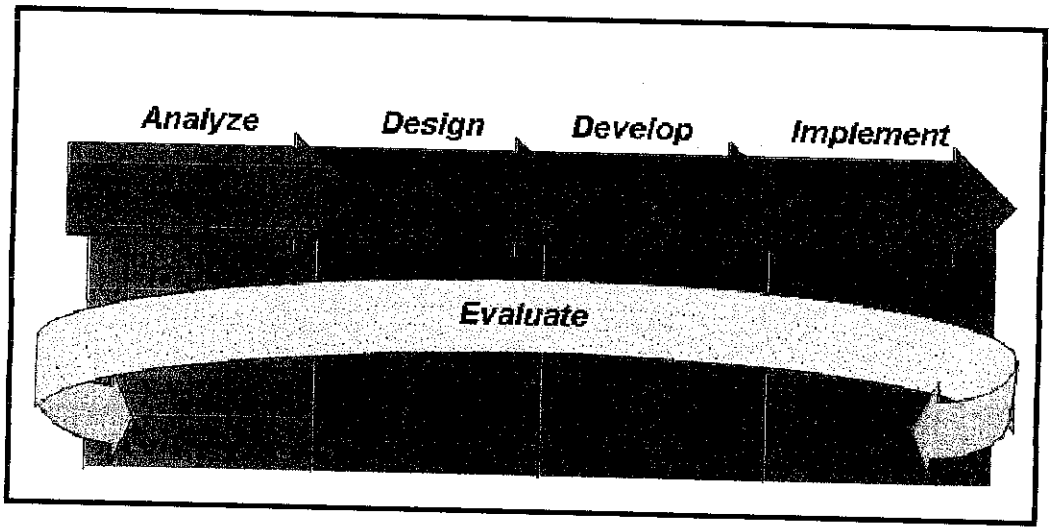
There are two parts in the evaluation phase which are formative and summative. The formative part can be seen in each stage of ADDIE process while summative part consists of tests designed for domain specific criterion-related referenced items and the users can also provide their feedback.

3.2 WHY ADDIE?

The ADDIE model for instructional systems design (ISD) is a five-phase generic model which consists of Analysis, Design, Development, Implementation and Evaluation. Each step has an outcome that feeds the next step in the sequence. Moreover, ADDIE model commonly used by instructional designers to develop course management system [6]. It is designed to ensure the learners will achieve the goals of the course, allows for the evaluation of learners' needs, to ensure the design and development of training materials and the last but not least is to ensure the effectiveness of the program using processes with specific, measurable outcomes.

In particular, ID focuses on the analysis of learning needs and goals, and the systematic development of instruction. To develop instructions, Instructional technology that is typically specifying a method that will facilitate knowledge transfer to the recipient if followed will be used.

Figure 3.1: Instructional Design Model (ADDIE Model) [36]



3.2.1 Discussion on how ADDIE model has been previously used for educational software design.

ADDIE first appeared in 1975. It was created by the Center for Educational Technology at Florida State University for the U.S Armed Forces. The purpose of this model was to develop systems that will provide a special training environment for entry level soldier [7].

3.2.2 How is ADDIE Model Applicable to design education CMS?

There are more than 100 different ISD models, but almost all are based on the generic "ADDIE" model, which stands for Analysis, Design, Development, Implementation, and Evaluation, as illustrated in the figure above. Each step has an outcome that feeds the subsequent step. During analysis, the designer develops a clear understanding of the "gaps" between the desired outcomes or behaviors, and the audience's existing knowledge and skills. The design phase documents specific learning objectives, assessment instruments, exercises, and content. The actual creation of learning materials is completed in the development phase. During implementation, these materials are delivered or distributed to the student group. After delivery, the effectiveness of the training materials is evaluated [8]. ADDIE model is applicable to design educational CMS because we can evaluate each phase in the model without waiting it to be completed first. It is because, evaluation of the system will take part in each phase and from that, the developer can add or modify features in the CMS that suit users' needs.

3.2.3 ADDIE Model Framework

Figure 3.2: ADDIE Framework

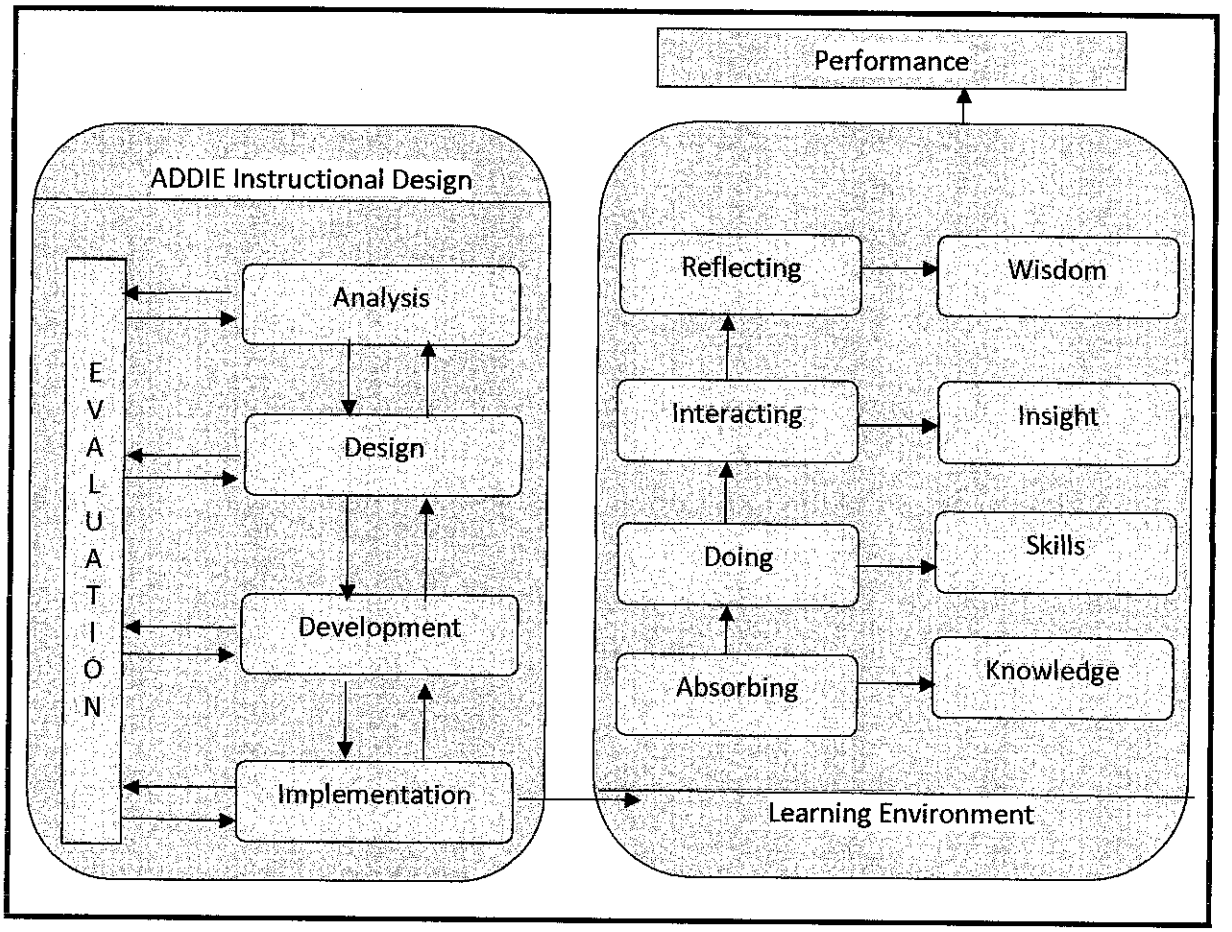
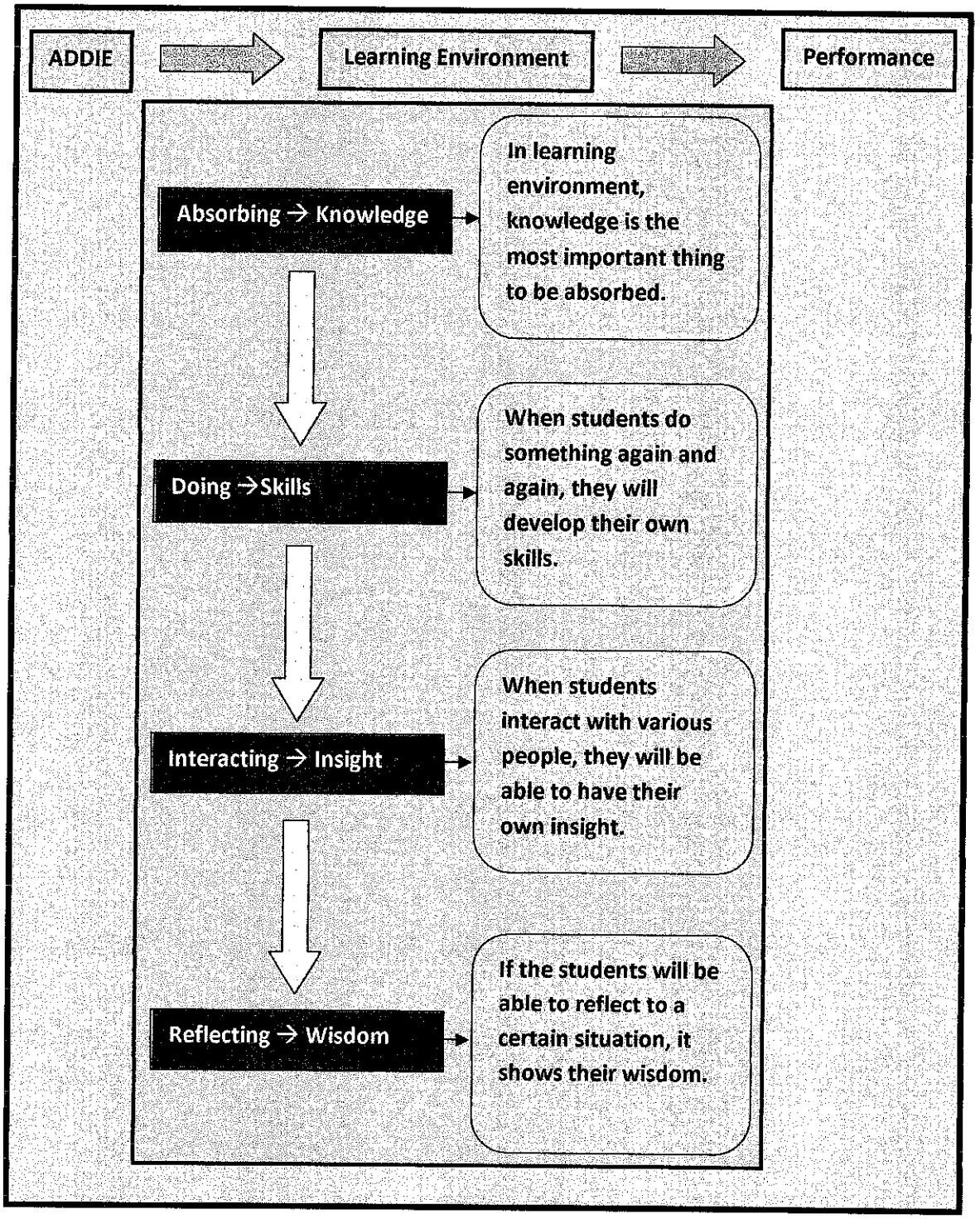


Figure 3.2 illustrate the ADDIE framework. The first stage in ADDIE model required a thorough analysis to gather all information about the learning predicaments, CMS characteristics, learners' needs and so on. During the design phase, a systematic process of redesigning Course Management System has been carried out to integrate the principles of pedagogy and andragogy learning into a CMS. The actual development process will be done right after design phase. The development emphasizes on a more iterative rapid module development. In the implementation phase, the system will be rolled out for pilot use. The study about the effectiveness of the system will be conducted and all the feedbacks will be considered to

improve the applied learning theories to make it more accurate. Figure 3.3 illustrates about the learning environment in ADDIE Model.

Figure 3.3: Learning Environment in ADDIE Model



3.2.4 Key Milestones

Key milestones are important events during the development of the said project. It lists down vital stages that can be used indirectly to determine how far the progress is. As for my project, there were shown in the table below:

Table 3.1: Final Year Project Key Milestone

Key Milestones	Status
Research and propose FYP Project	Done
Research on the functionalities to be included in the e-learning	Done
Design the software process flow	Done
Develop the storyboard/User Interface Design	Done
Review the storyboard/User Interface Design	Done
Build the prototype	Done
Evaluate the prototype	Done
Redesign the prototype	Done
Reevaluate the prototype	Done
Complete the prototype to become actual software	Done
Review software	Done

3.2.5 Gantt Chart

For Gantt chart, I just followed the suggested one from the FYP Guidelines.

Figure 3.4: Gantt chart for FYP 2

No	Detail/Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Project work														
2	Submission of Progress Report II														
3	Pre-EDX														
4	Dissertation														
5	Viva														
6	Final Dissertation														

CHAPTER 4

RESULTS AND DISCUSSION

4.1 QUESTIONNAIRE (BEFORE DEVELOPMENT PHASE)

The objective of the questionnaire is to gather information from targeted respondents about their information seeking behavior and the current Course Management System (CMS). The targeted respondents are divided into two major groups which are university/college students and distance learners. Suggested universities to be observed are UTP, UITM Shah Alam and UM. The targeted distance learners are those who are studying in OUM Kuala Lumpur. You can see the survey question for universities students in APPENDIX 1 while for distance learners in APPENDIX 2.

4.1.1 Survey on Information seeking behavior, student demographic and existing Course Management System.

Survey Outcomes

Universities Students

University Technology of PETRONAS (UTP)

A survey has been conducted to 36 students from UTP consists of engineering and computer and information system students. The main objectives of the survey are to study about their information seeking behavior and also to gather their viewpoint about the current Course Management System in UTP which is e-Learning [22].

The result of the survey has been documented in a spreadsheet and analyzed. For the section A which is the demographic section, all the respondents are full-time undergraduate students and all of them are single. It means that, they are staying in the hostels provided by UTP.

For section B, a study about the infrastructure has been carried out. 100% of the respondents have the internet connection in their hostels and most of the time; they prefer to access the e-Learning in their rooms instead of going to Information and Resources Centre (IRC) to surf the internet. To them, by surfing from their hostels is more convenience and easier. Although the internet connection is available in their room, 75% of the respondents encountered the same problem which is about the poor internet connection. And some other students are facing problem with the information whereby there are so much information to scan and the specific information is not available for public access.

In section C, data about information sources and channels used by students has been gathered and analyzed. 91.67% of the respondents

look for information for subjects taken weekly and some of them prefer to search daily. As we know, UTP is offering technical courses which are technology courses and engineering courses. Because of that, most of the students tend to look for technical information frequently if compared to other information such as government information, current issues, medical information, sports information and others. The average hours 72.22% of the respondents spend looking for information is 0-5 hours and they prefer to use World Wide Web as the preferred information source. The other sources the use the most are text books assigned to the course, handouts from lecturer and online database. The most preferable search engine by UTP students is Google because it is reliable, faster and user friendly. In UTP, all students use Moodle (e-Learning) to assist their study because the system provide a platform for both students and lecturers to share information and knowledge either related to their subjects or other topics.

The next section will be discussed about Course Management System (CMS) in UTP which is UTP e-Learning. 75% of the respondents agreed that the CMS is normal. Not too boring and not too interesting. The rest thought that UTP e-Learning is boring and has limited function to students. In the e-Learning, the most preferable section is the Course page because they can get lecture notes, look for announcement, check their grades, submit their assignment online, participate in discussion forum and enroll for online quizzes. The features that they think can support two-way communication are discussion forum and instant messaging. 75% of the respondents agreed that the e-Learning becomes so useful to the students when they want to download lecture notes and another 15% said when the students want to look for announcements. Lastly, 75% of the respondents expect to get lecture notes from e-Learning and the rest expect e-Learning will become more interactive for their learning environment.

The last but not least is Section E which is motivation and satisfactory level. The most preferable information resource is World Wide Web that covers 19.29% of the total value and follows by journal articles and library books which are 14.89% and 12.52%. The lowest value is newspaper which is 8.60%. Kindly see APPENDIX 3.

Universiti Kebangsaan Malaysia (UKM)

A survey to study about information seeking behavior has been conducted to Universiti Kebangsaan Malaysia (UKM) students. The total of 5 students has become the respondents for this survey. The respondents consist of students majoring in Science and Technology and Business and Administration.

For section A which is demographic section, all of the respondents are full-time undergraduate student and they are also single. They are staying in the provided hostels in their campus area. Because of that, it is easier for them to go to class.

In section B which is infrastructure, all of the respondents have internet access in their hostels. They prefer to access e-Learning in their own room because it is convenient. Even though they have internet access in their room to surf the internet, they still encounter a problem to search for information which is the specific information not available.

For section C which is information sources and channels, 80% of respondents prefer to look for information for subjects taken weekly and another 20% prefer to search daily. The most preferred information by UKM respondents is Science Information, followed by social information and technical information. 80% of the respondents spend 0 to 5 hours in a week to look for information and another 20% spend 16

to 20 hours in a week. 80% respondents prefer to use World Wide Web (WWW) as the information source and handout from lecturer 20%. Their favorite search engine is Google because it is faster and reliable.

The next section is Section D, Course Management System. 60% of the respondents find that their e-Learning is normal and another 40% find that the e-Learning is interesting. All of them agree that the Course page is the most important feature in e-Learning because there are so many things can be done in the course page. For them, forum is one of the features that can support two-way communication between lecturer and students. The e-Learning has become so useful when they want to download lecture notes.

The last section is Section E which is motivation and satisfactory level. The most preferable information resource by UKM respondents is World Wide Web (WWW) with 21.05%, follows by lecture notes and library books with 20.68% and 17.67% of the total value. Kindly see APPENDIX 3.

Universiti Malaya (UM)

A survey has been conducted to 6 students from UM consists of Biotechnology and science and technology students. The main objectives of the survey are to study about their information seeking behavior and also to gather their viewpoint about the current Course Management System in UM.

For section A which is demographic section, all of the respondents are full-time undergraduate student and they are also single. They are staying in the provided hostels in their campus area. Because of that, it is easier for them to go to class.

For section B, a study about the infrastructure has been carried out. 100% of the respondents have the internet connection in their hostels and most of the time; they prefer to access the e-Learning in their rooms instead of going to library to surf the internet. To them, by surfing from their hostels is more convenience and easier. Although the internet connection is available in their room, 100% of the respondents encountered the same problem which is about the poor internet connection.

For section C which is information sources and channels, 66.67% of respondents prefer to look for information for subjects taken weekly and another 33.33% prefer to search daily. The most preferred information by UM respondents is current issues, followed by science information and leisure information. 66.67% of the respondents spend 0 to 5 hours in a week to look for information and another 33.33% spend 6 to 10 hours in a week. 100% respondents prefer to use World Wide Web (WWW), library books and handout form lecturer as the information sources. Their favorite search engine is Google because it is faster and reliable.

The next section is Section D. This section will be discussed about Course Management System (CMS) in UM. 66.67% of the respondents agreed that the CMS is in normal stage. Not too boring and not too interesting. The rest thought that UM e-Learning is boring and has limited function to students. In the e-Learning, the most preferable section is the Course page because they can get lecture notes, look for announcement, check their grades, submit their assignment online, participate in discussion forum and enroll for online quizzes. The feature that they think can support two-way communication is discussion forum. 100% of the respondents agreed that the e-Learning becomes so useful to the students when they want to download lecture notes. Lastly, all of the respondents only expect to get lecture notes from their e-Learning.

The last section is Section E which is motivation and satisfactory level. The most preferable information resource by UM respondents is World Wide Web (WWW) with 25.47%, follows by lecture notes and journal articles with 18.81% and 10.71% of the total value. Kindly see APPENDIX 3.

Distance Learners

Open University Malaysia (OUM)

In Malaysia, education is one of the most important subjects everyone is talking about. It becomes the biggest challenge for government to bring the country to become a fully-developed country by the year of 2020. Universities are struggling in updating their offered programmes and make full use of latest technology to improve the delivery systems. Nowadays, people are talking about Open and Distance Education, one of the emerging delivery systems which is fast becoming the way to provide education to the masses.

Because of that, a survey to study about the distance learning students has been carried out. The purposes of the survey are to gather possible information about their information-seeking behavior and their opinion about their e-learning that has been provided by their learning institution.

All the respondents are part-time graduate students and they are already working. 60% of them are married and another 40% are still single. All of them stay in their own house.

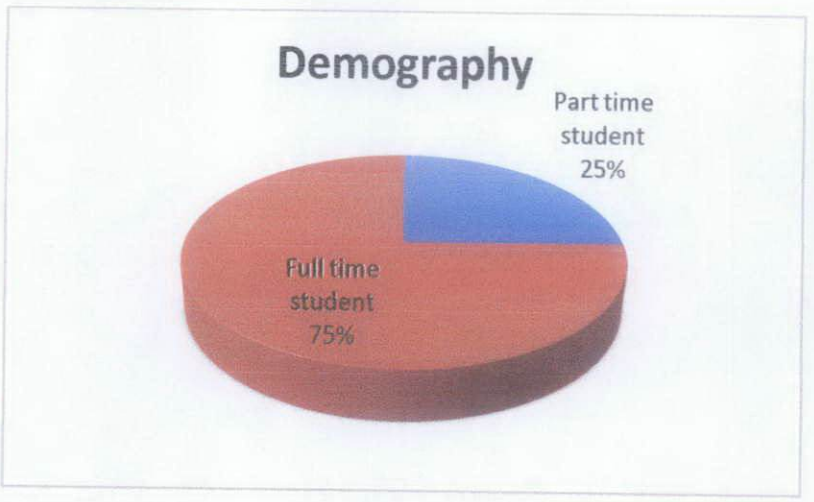
For Section B which is infrastructure, all of the respondents have internet access at their home. It will make them easier to get

information, lecture notes and so on. They can also access their learning institution e-Learning from home, get updates and submit their assignments to their lecturers. According to the respondents, all of them agree that the difficulty they encountered when they want to do their assignments is the specific information is not available. They can find information from the internet, but it is hard to find accurate information about certain topic. For university students, they can find it in library.

For Section C, which is Information Sources and Channels, they tend to find information about their subjects weekly which is during weekend. The main reason for this is because, there are working people and they need to give their full commitment to their work during working hours. According to the survey result, the most preferred information for distance learner is government information, follows by sports information and current issues. The lowest priority information is medical information and this is because, all of the respondents are taking business and management course. 60% of the respondents spend 6 to 10 hours a week to look for information and the rest spend 0 to 5 hours a week. They also prefer to use World Wide Web (WWW) and Google search engine to get information. The software they like to use to assist their study is instant messenger to contact lecturers or other students. Kindly see APPENDIX 3.

Analysis 1: Demographic

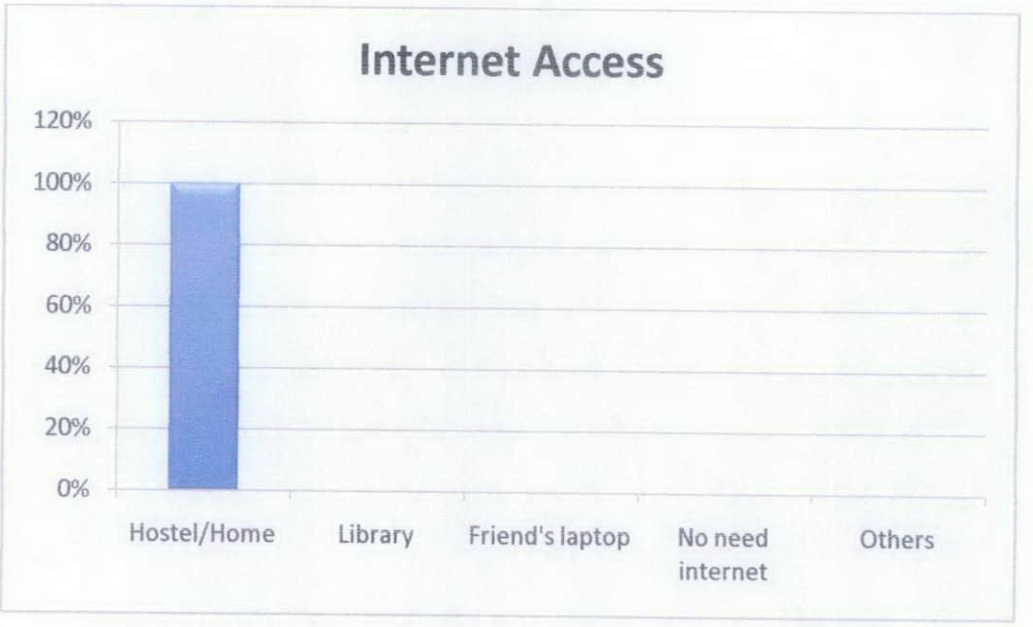
Figure 4.1: The targeted respondents



In this project, the main respondents are students who are having an account in a Course Management Systems. The respondents are divided into two major categories which are university students and Open University student. From all the respondents, most of them are full time student while the rest are part time student.

Analysis 2: Infrastructure

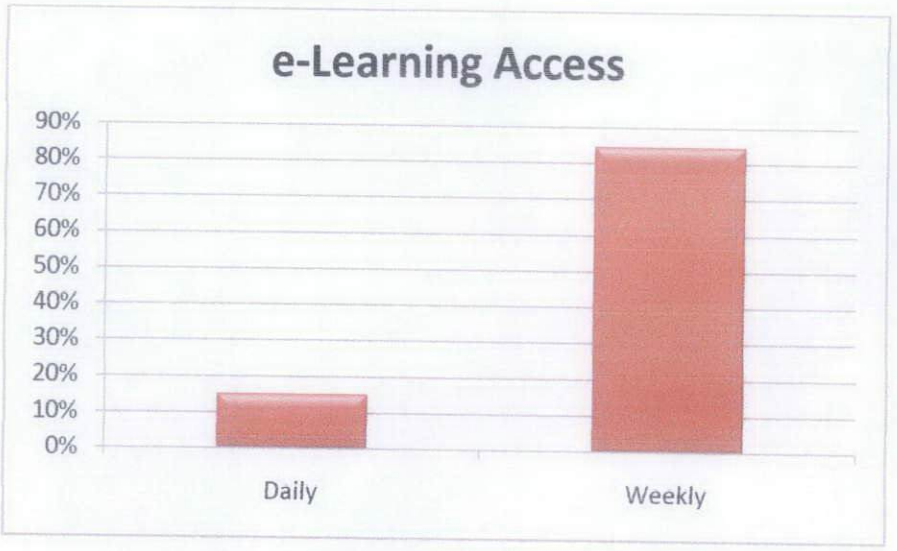
Figure 4.2: Preferred Internet Access



According to figure above, we can conclude that all of the targeted respondents would prefer to access internet to find information at their hostel or home. It is because, they have other things to do so that they have no time to go to any other places for example cyber café to seek information.

Analysis 3: Information Sources and Channel

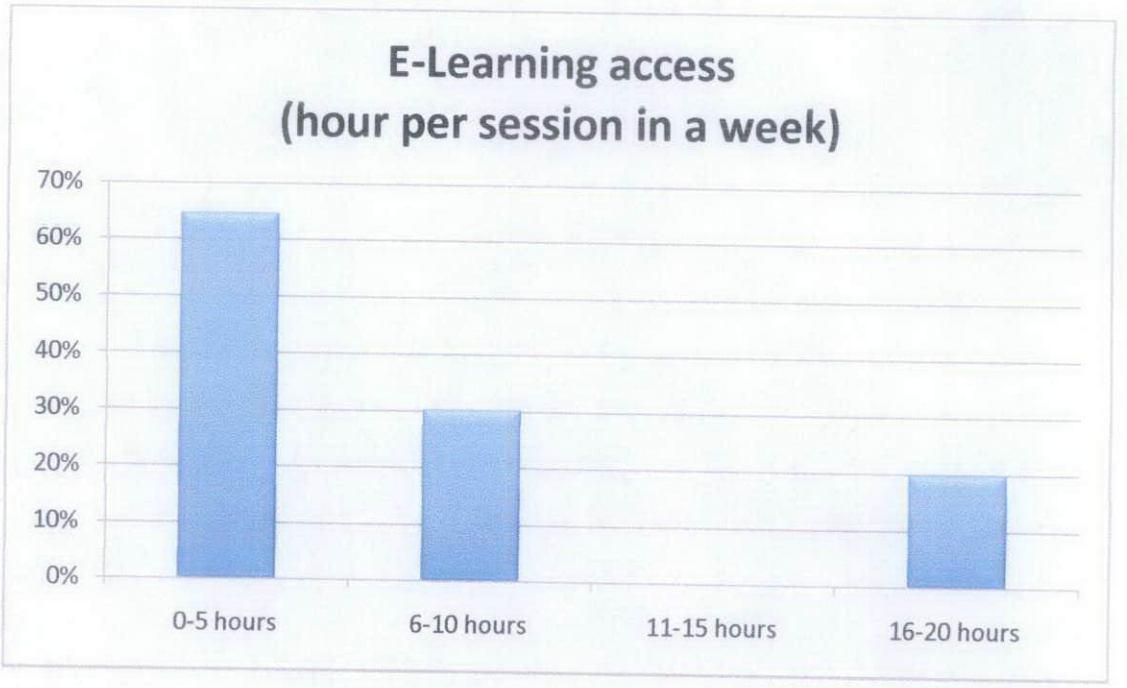
Figure 4.3: E-Learning access by respondents



According to this survey, almost 85% of the respondents access their e-Learning weekly to get learning materials or to retrieve any information. Only 15% of the respondents consistently check their e-Learning portal daily. From this bar chart, we can conclude that the respondents only access their e-learning just to get learning materials from their lecturer. So, interaction and knowledge transfer between student and lecturer or student and student happen rarely.

Analysis 4: Respondents information seeking session through e-learning in a week

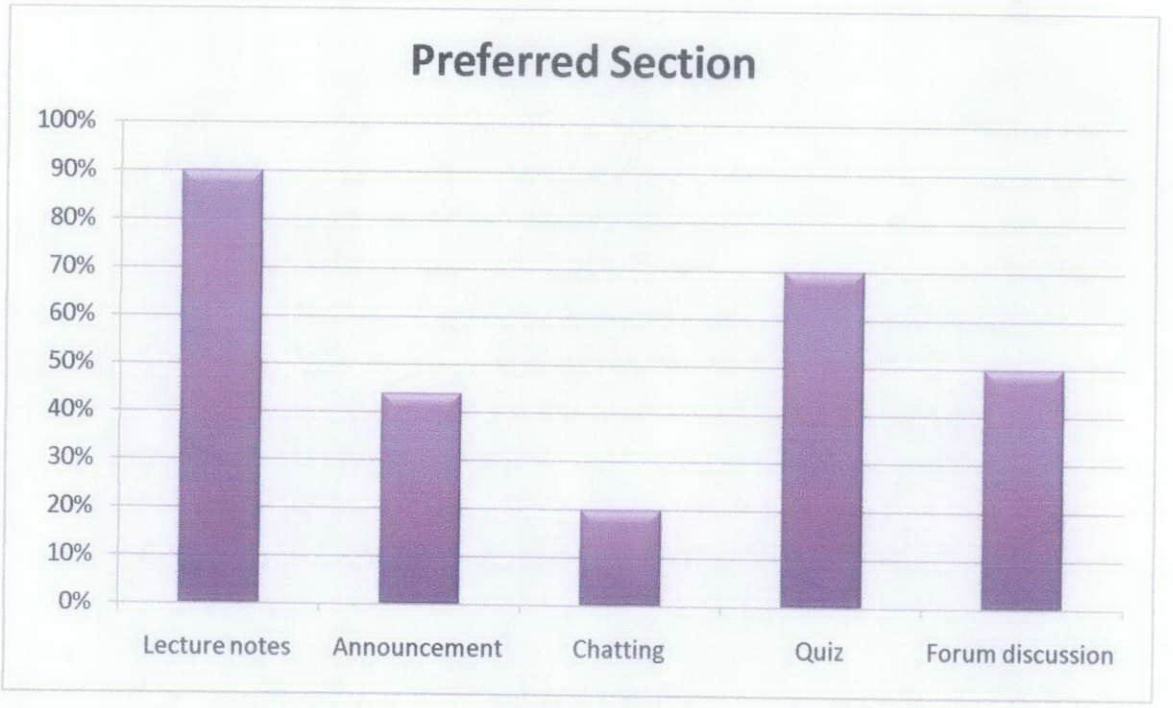
Figure 4.4: E-Learning access (hours per session in a week)



Based on the chart above, we can see that about 65% of the respondents only spend 0-5 hours per week to use e-learning in order to get information from their lecturer. Only 20% of the respondents spend more than 16 hours per week accessing their e-learning. We can conclude that, respondents are not attracted enough to fully utilize their own e-learning. Hence, the existing e-learning need to redesign to attract their attention.

Analysis 5: Respondents' preferred sections in e-learning

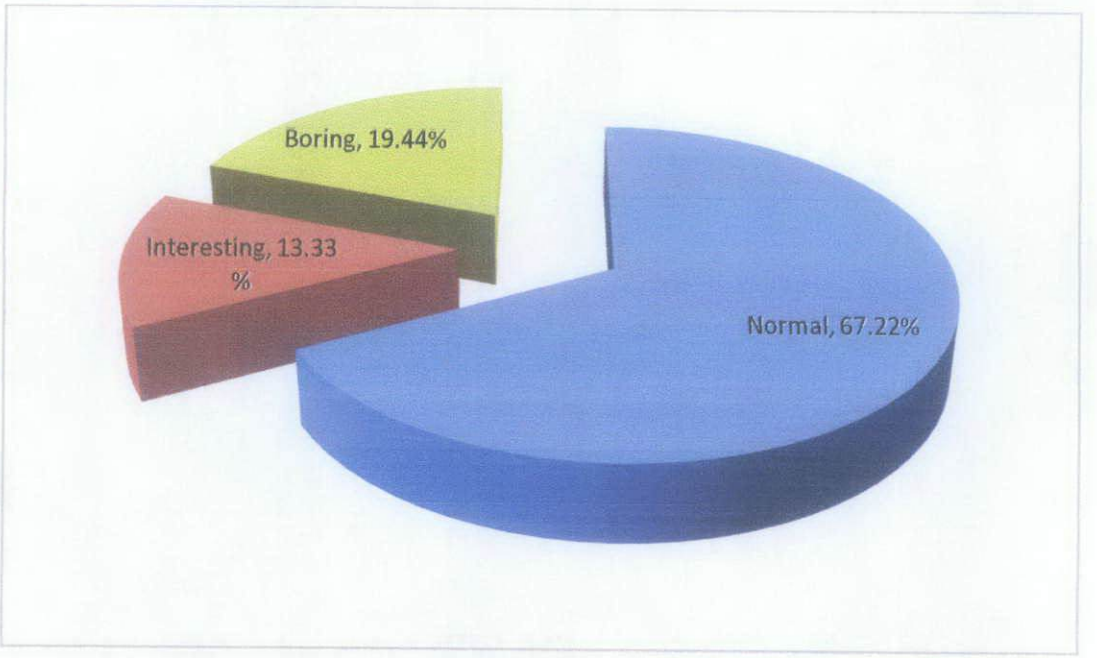
Figure 4.5: Preferred section in e-learning



In this analysis, we can see that almost 90% of the respondents agree that their e-learning main purpose is to download lecture notes followed by quiz, forum discussion, and announcement and chatting. From this analysis, it is proved that the respondents don't really use the other features in their e-learning to do knowledge sharing and knowledge transfer. There are so many assumptions can we made for example, the e-learning is not attractive enough for them to do all those things or maybe the features are not available for them.

Analysis 6: Course Management Systems/E-Learning

Figure 4.6: Respondents' point of view towards their e-Learning



Based on this survey, we can conclude that more than half respondents agreed that their e-learning is normal, not too bad and not too interesting. All of they are adults learner and to attract their attention to use the e-learning, more andragogy features need to be added.

Analysis 7: Information Sources

Figure 4.7: Respondents' information sources

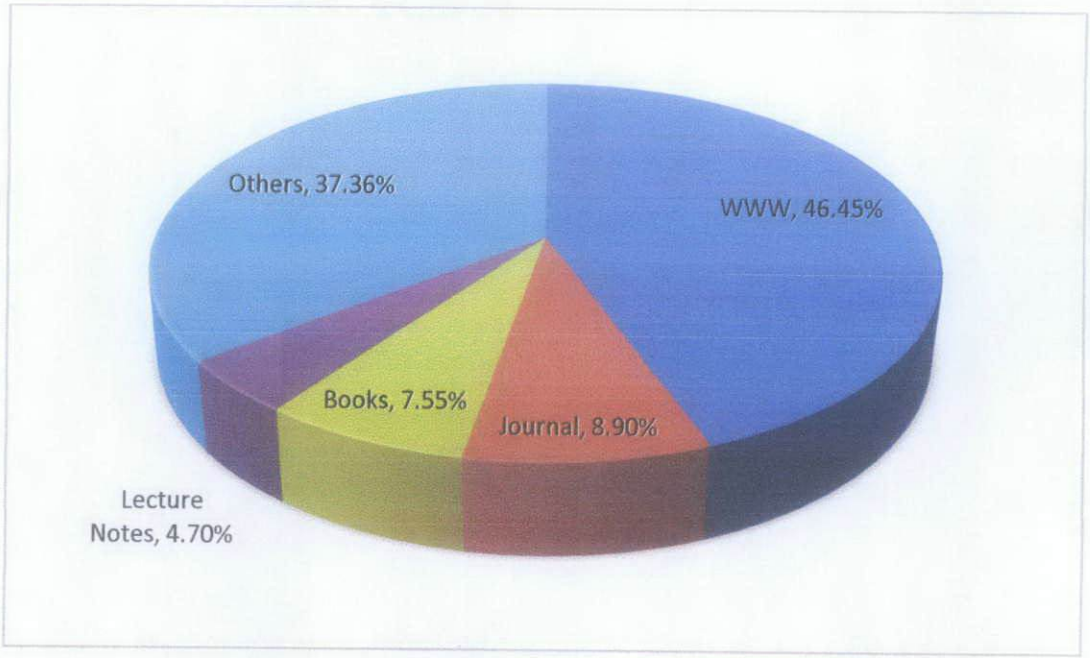


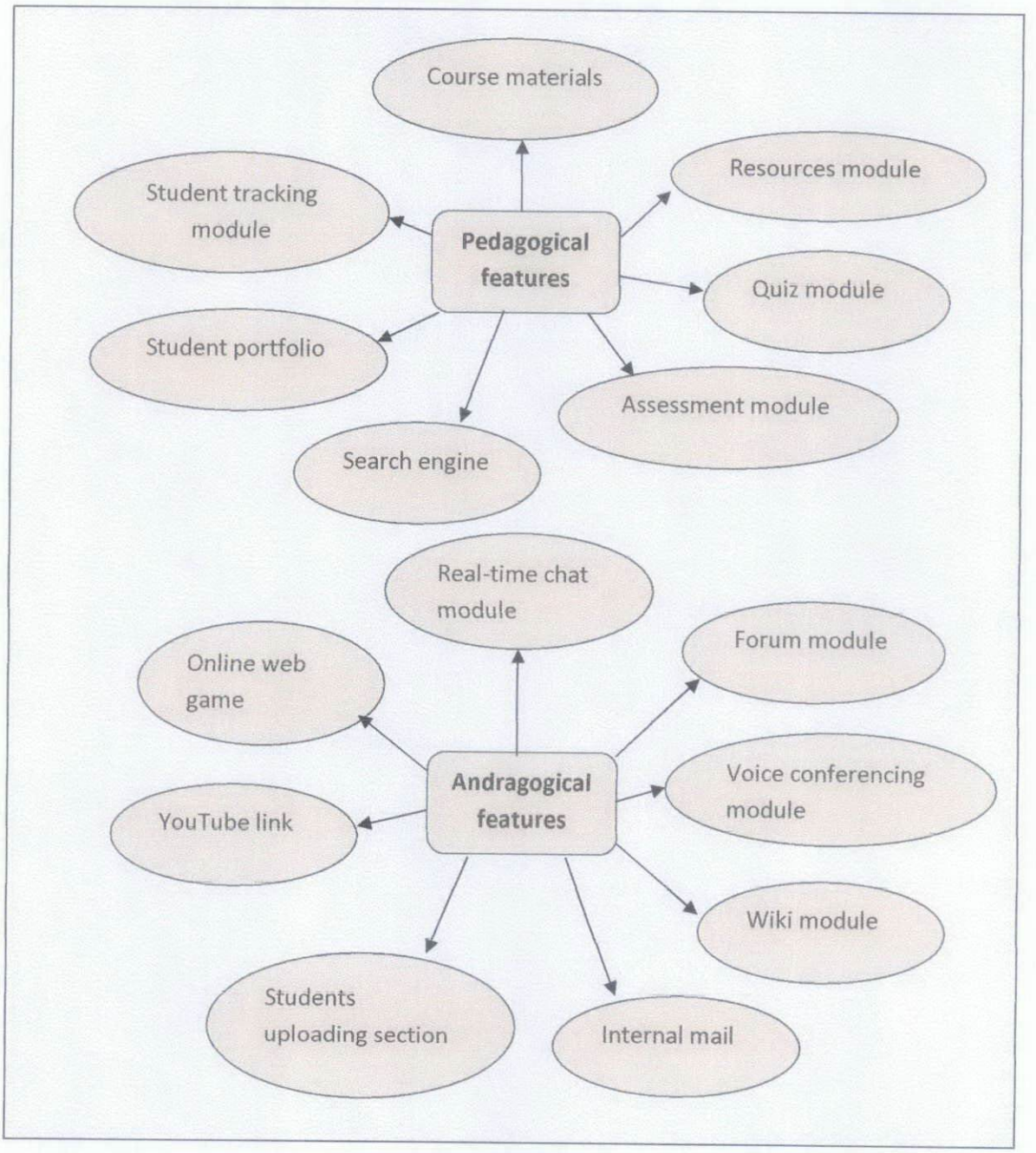
Figure above shows us the information sources for the respondents. World Wide Web (WWW) has become the most preferable source for them to seek information with the largest proportion of the pie chart which is 46.45%, almost half of the respondents compared to other sources.

4.2 RECOMMENDATION ON HOW THE CMS SHOULD BE REDESIGNED

Educational features

E-learning has made a jump in the education system. E-learning is a term that is used to refer to computer-based learning. E-learning uses web-based training and teaching materials, CD-ROMs, learning management software, discussion boards, e-mail, computer-aided assessment, simulation, online conferencing and other related method. The design and learning principles of CMS assume pedagogical learning for all learners. But, there are some parts or situations that require andragogical concept to support learning process. After a thorough study about pedagogical and andragogical learning style, it is found that both learning styles are really important for adult learners, specifically higher education students. Because of that, it is decided to redesign the Course Management System (CMS) through applying andragogy and pedagogy learning theory. The proposed features that should be existed in this CMS to support pedagogy and andragogy learning style are course materials, resources module, quiz module, assessment module, search engine, students portfolio, student tracking module, real-time chat module, forum module, voice conferencing module, Wiki module, internal mail, students uploading section, YouTube link and problem solving-based web game.

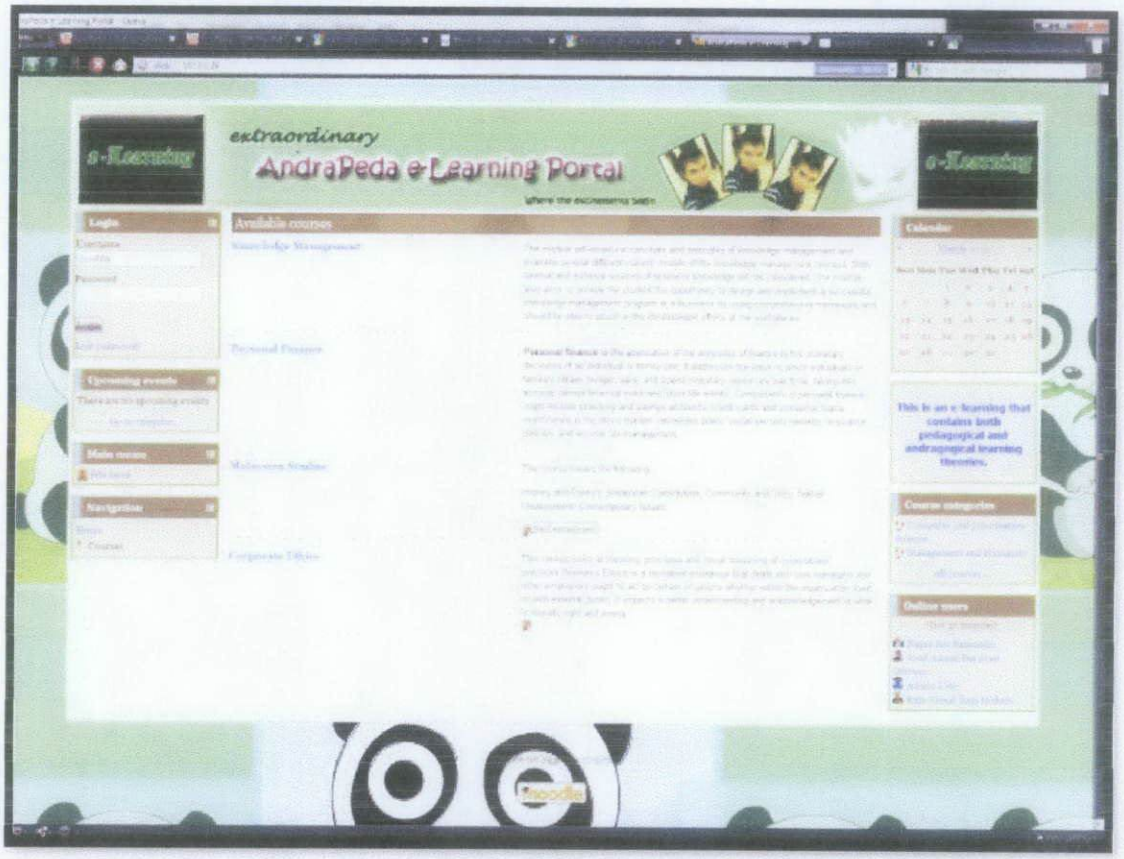
Figure 4.8: Recommendation on how the CMS should be redesigned



4.3 INTERFACE DESIGN

Login Page

Figure 4.9: AndraPeda e-Learning login page screenshot



In computer security, a login or logon is the process by which individual access to a computer system is controlled by identification of the user using credentials provided by the user. A user can log in to a system to obtain access and can then log out or log off (perform a logout / logoff) when the access is no longer needed. To log out is to close off one's access to a computer system after having previously logged in [15].

In this e-learning, a login page has been developed for the user to login and access the content of the e-learning. In the project, the main variables used are username and password. The username is determined and created by administrator along with the password. So, administrator can restrict this for authorized users only.

Course Module

Figure 4.10: AndraPeda e-learning course module screenshot

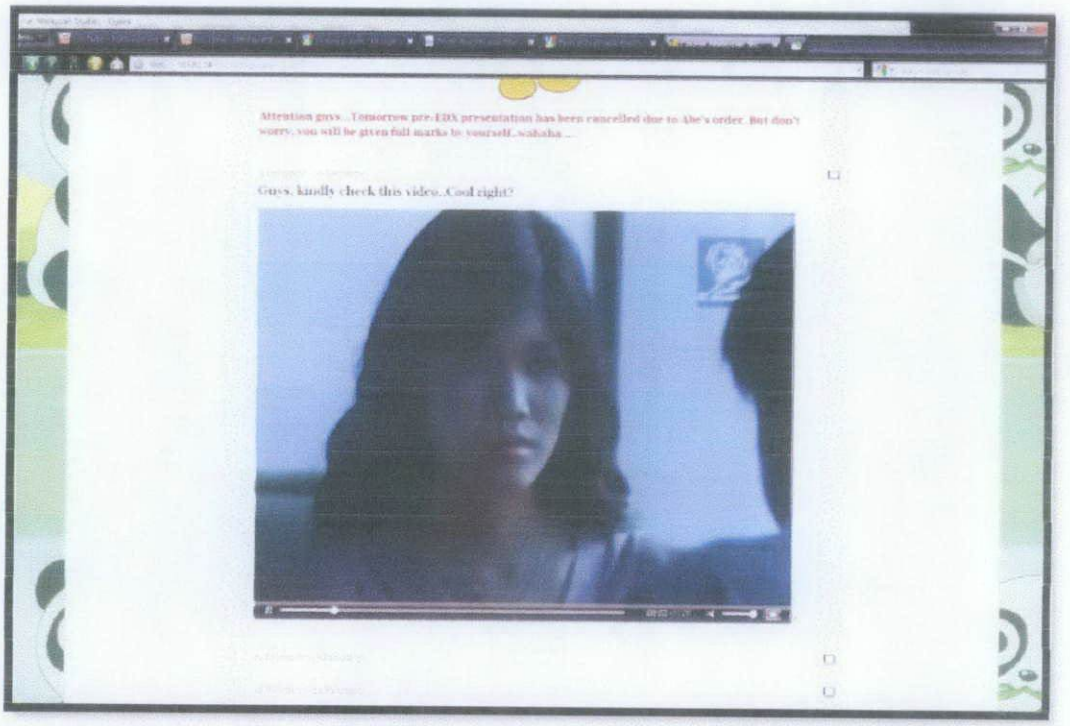
In higher educational institution e-learning, the main feature needs to be there is course page. It is because, this feature is like the heart of an e-learning. There are many parts of a course homepage for example:

Table 4.1: AndraPeda e-Learning homepage parts

• Course full name • navigation bar • Course description • Participant list • Forum list • Course administration block • Section header	• Future week • Login information • Edit on button • Latest news • Upcoming events • Recent activity • Current week

Multimedia Module

Figure 4.11: AndraPeda e-learning multimedia module screenshot



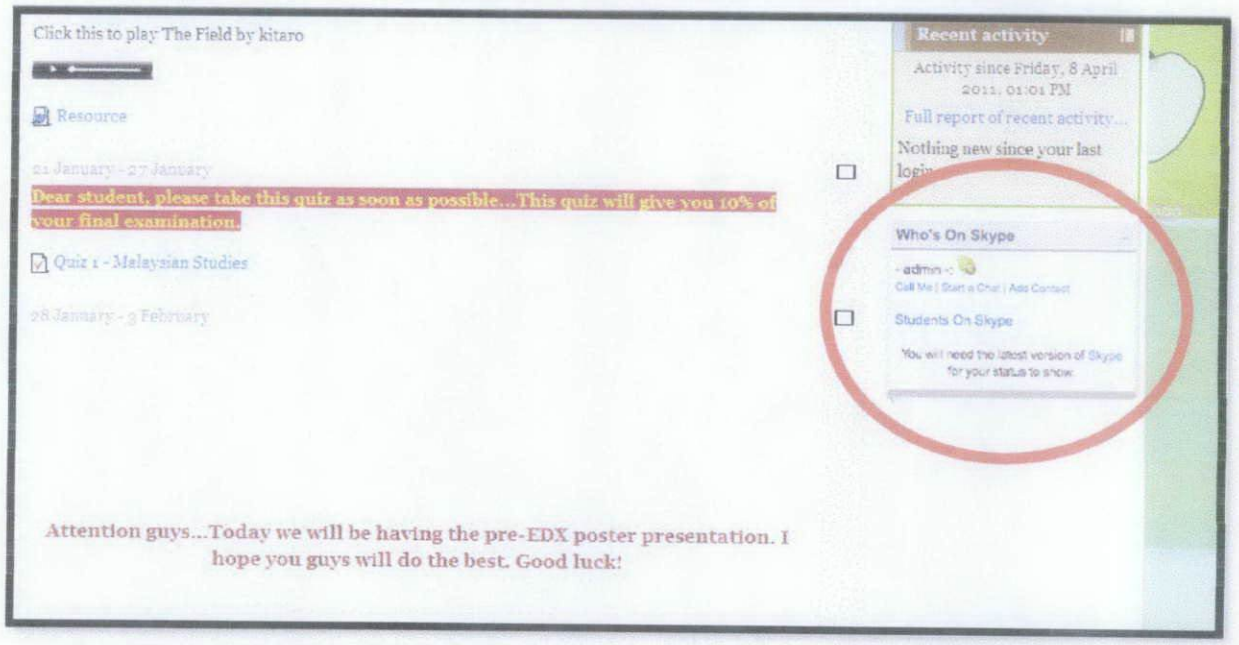
In order to make this e-learning more attractive, multimedia plug-ins such as video and audio have been enabled. Multimedia can stimulate more than one sense at a time, and in doing so, may be more attention-getting and attention-holding [16].

Here are some of educational benefits of multimedia tools [17]:

- ✓ Provide students with opportunities to represent and express their prior knowledge.
- ✓ Multimedia applications engage students and provide valuable learning opportunities.
- ✓ Encourages deep reflective thinking.

Skype Plug-in

Figure 4.12: AndraPeda e-learning Skype plug-in screenshot



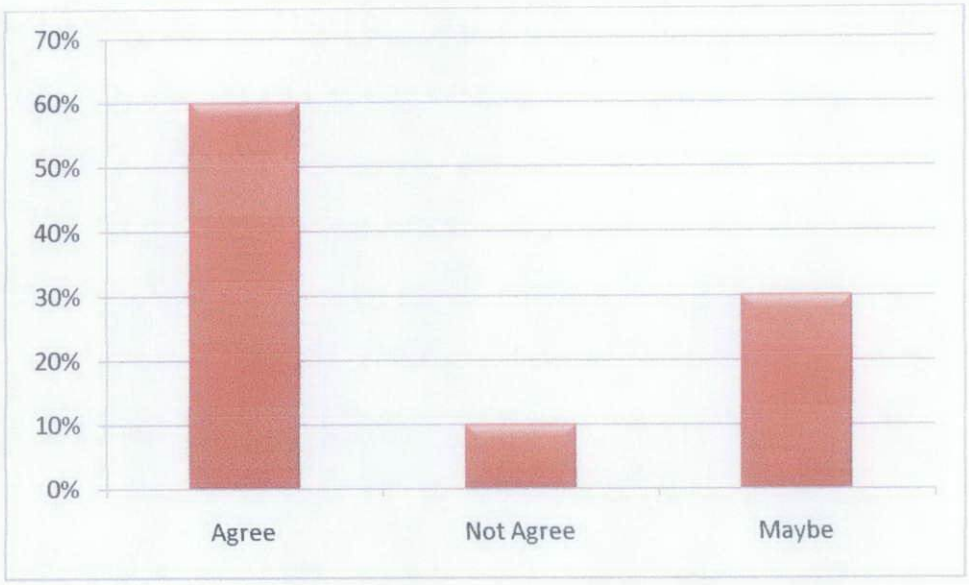
According to the study that has been done during FYP 1, Skype plug-in can make this e-learning better and attractive. Skype invites lecturers and students to collaborate on a project, and share skills and inspiration around specific teaching needs. Teachers all over the world are using Skype to make learning more exciting and memorable. It's easy to see why: Skype offers an immediate way to help students discover new cultures, languages and ideas, all without leaving the classroom [18].

4.4 QUESTIONNAIRE (AFTER DEVELOPMENT PHASE)

- ***Question 1***

  Statement: I have tried AndraPeda e-learning and I found that this e-learning is more attractive (color, new features and ability to keep users' interest).

Figure 4.13: Question 1

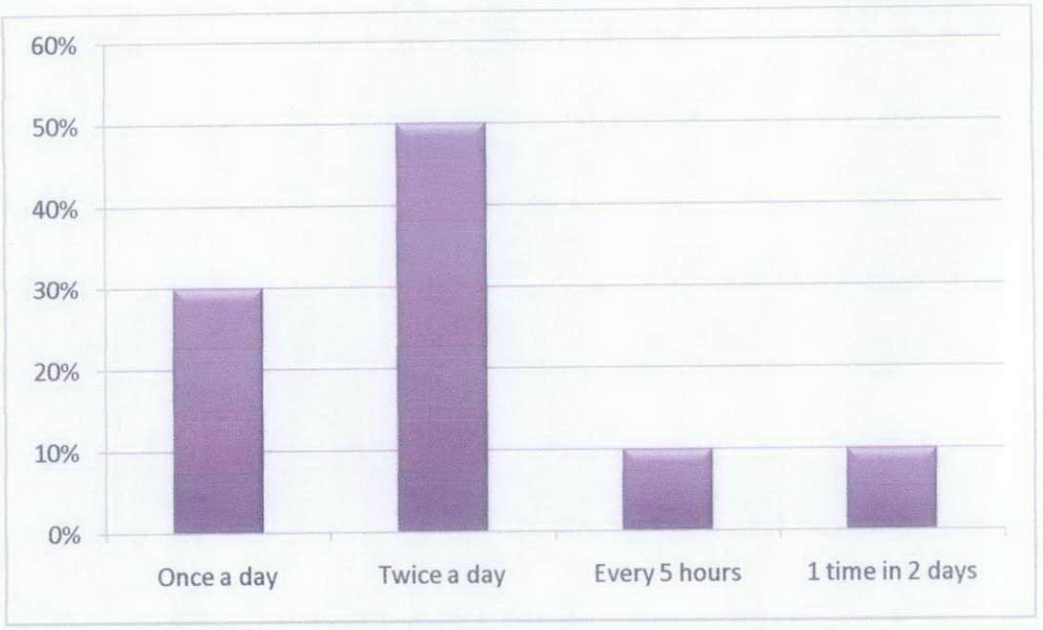


According to question 1, we can see that 60% of AndraPeda e-learning testing users agree that this e-learning is more attractive and only 10% of them don't agree with the statement. From this analysis, we can assume that users' interest can be enhanced if the e-learning has all the criteria to make it interesting (color, features, etc)

- **Question 2**

  Statement: How often do you think you will use AndraPeda e-Learning to seek information?

Figure 4.14: Question 2

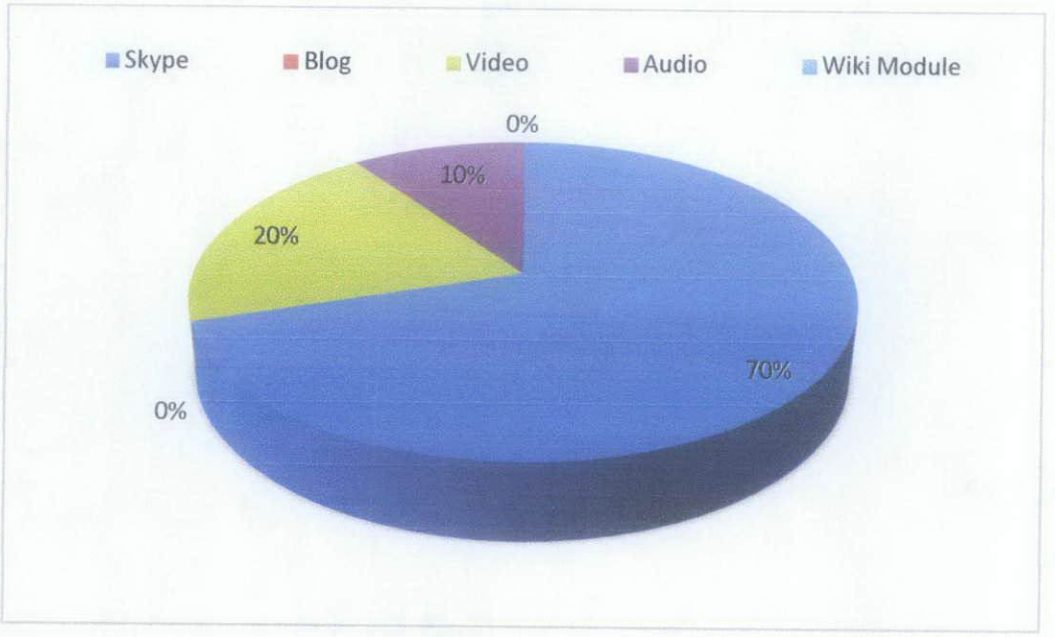


Bar chart above shows us that 50% of the testing users would like to access AndraPeda e-learning twice a day, 30% once a day, 10% every 5 hours and another 10% one time in 2 days. This statistic prove that this e-learning concept can attract user to use more frequent if compare to the existing e-learning concept as shown in questionnaire before development phase.

- **Question 3**

  Statement: Which additional feature in AndraPeda e-learning do you think can develop your interest the most towards knowledge sharing through e-learning?

Figure 4.15: Question 3

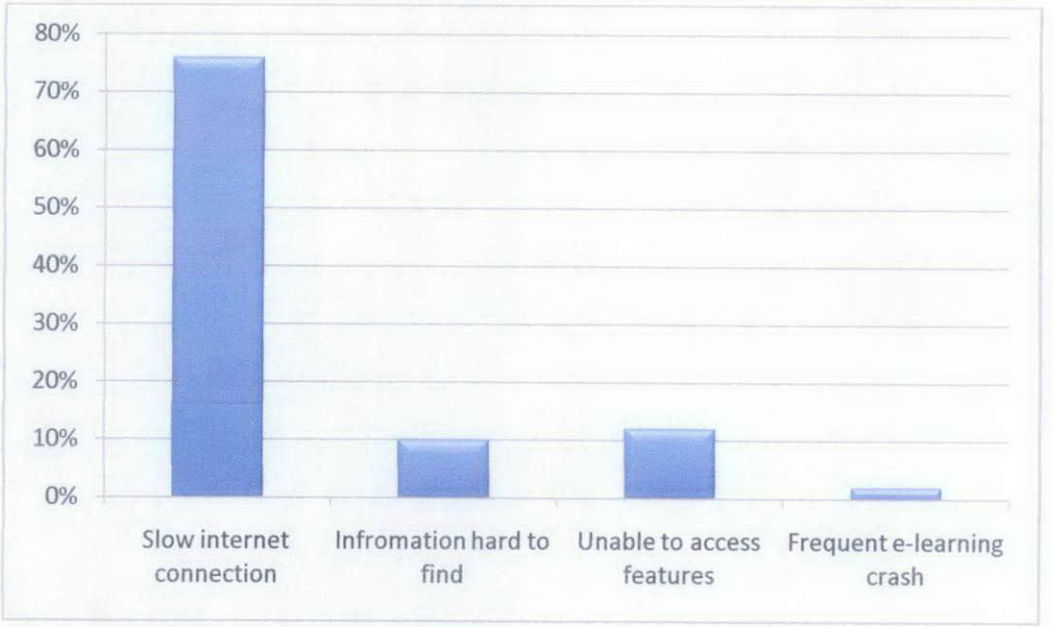


Based on pie chart above, most of the testing users agree that Skype is the most attractive feature that supports knowledge sharing in AndraPeda e-learning which covers 70% of them, followed by video and audio which cover 20% and 10% each. There are so many functions available in Skype that are really useful in virtual learning environment. Students and lecturers can create a discussion group in Skype and start discussing with each other. There are also video conferencing feature in Skype which enable people to talk to each other face-to-face. So, from this analysis, we can conclude that an e-learning should has a very convenient knowledge sharing technology (which in this case is Skype) to encourage knowledge transfer between learning community.

- **Question 4**

  What are the main causes that you encountered when accessing an e-learning?

Figure 4.16: Question 4



Bar chart above shows that more that 70% of targeted respondents are facing slow internet connection problem during accessing e-learning. 12% of them are facing difficulties to access features, 10% are facing difficulties to find information and another 2% encounter frequent e-learning crash. Most of the targeted respondents suggest that, an improvement towards internet speed not to be done as soon as possible.

- **Question 5**

  Statement: I will use the new e-learning that is implementing both pedagogical and andragogical features once it is developed.

Figure 4.17: Question 5

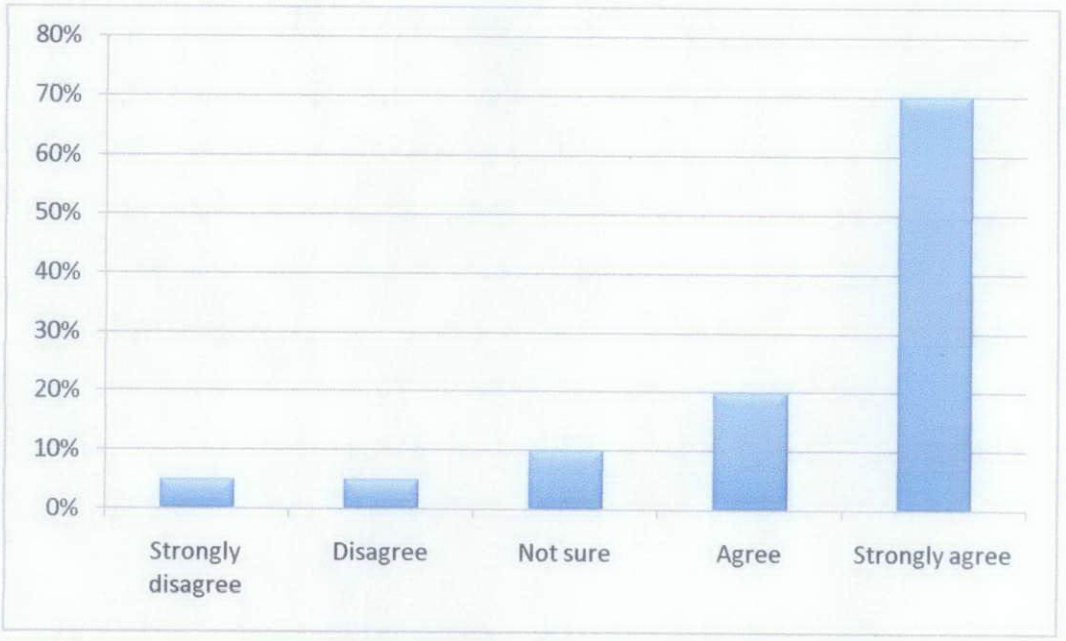


Figure above shows that 70% of respondents are strongly agreed that they will use the system once it is developed. The other 20% of respondents are agreed with the statement. Meanwhile, the other 10% of students are not sure with the statement while 5% are not agreed with the statement. The other 5% of respondents is strongly disagreed with that statement. The result shows that the system will be used by many respondents once it has been developed.

- **Question 6**

  Statement: I prefer cheerful theme and color to be used for e-learning background.

Figure 4.18: Question 6

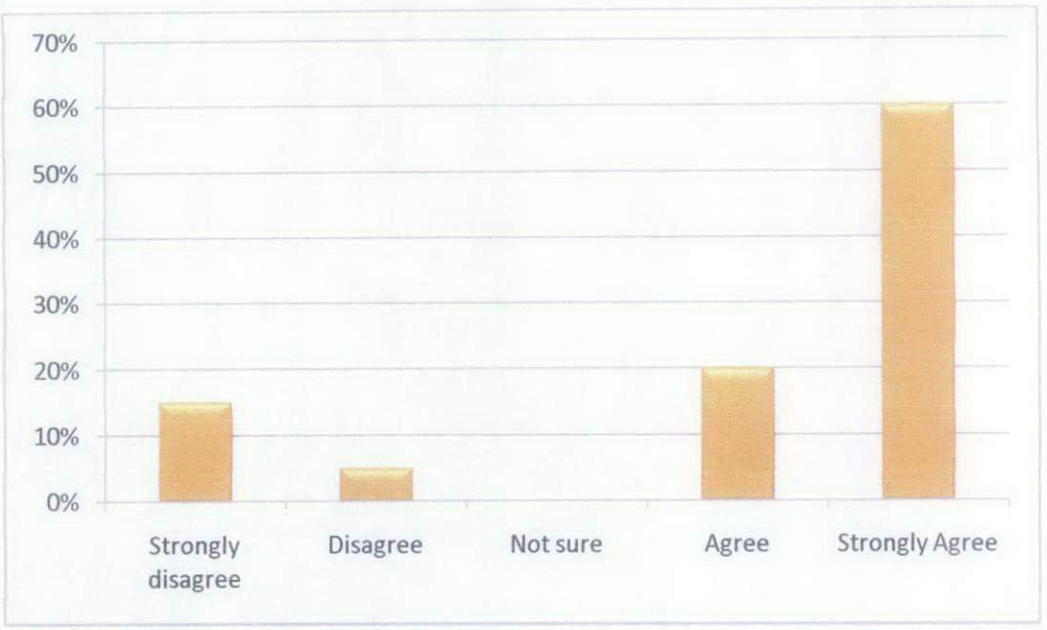


Figure above shows that there is no respondent are not sure about the statement while 20% of them agreed and the other 5% are not agreed. The other 15% of them are strongly disagreed while 60% of them are strongly agreed with the statement. This shows that many of them wants the background of the e-learning must be attractive enough to avoid the user from feeling gloomy.

4.5 RESULT OF THE QUESTIONNAIRE

Based on the overall analysis, most of the respondents want the e-learning functions to be enhanced because they are students in higher learning institution. So, they rarely see their lecturer to get advice and maybe lecture materials. So, they just have e-learning as a medium to communicate and exchange knowledge among themselves. The studies above had been done to determine the features that can be added into a CMS, in between the existing features, combine and redesign it to make the CMS becomes more efficient and attractive. From the survey also, we can see that about 70% of the respondents strongly agree to use the new CMS (which contains both pedagogical and andragogical features) once it is developed while another 20% agree it is developed. In order to develop this e-learning, 60% of the respondents strongly agree the background of the e-learning need to be cheerful to avoid gloomy. Last but not least, the e-learning need to be a combination of all factors including psychology aspect as well.

4.6 FUNCTIONAL MODEL: USE CASE DIAGRAM

Figure 4.19: Use Case Diagram

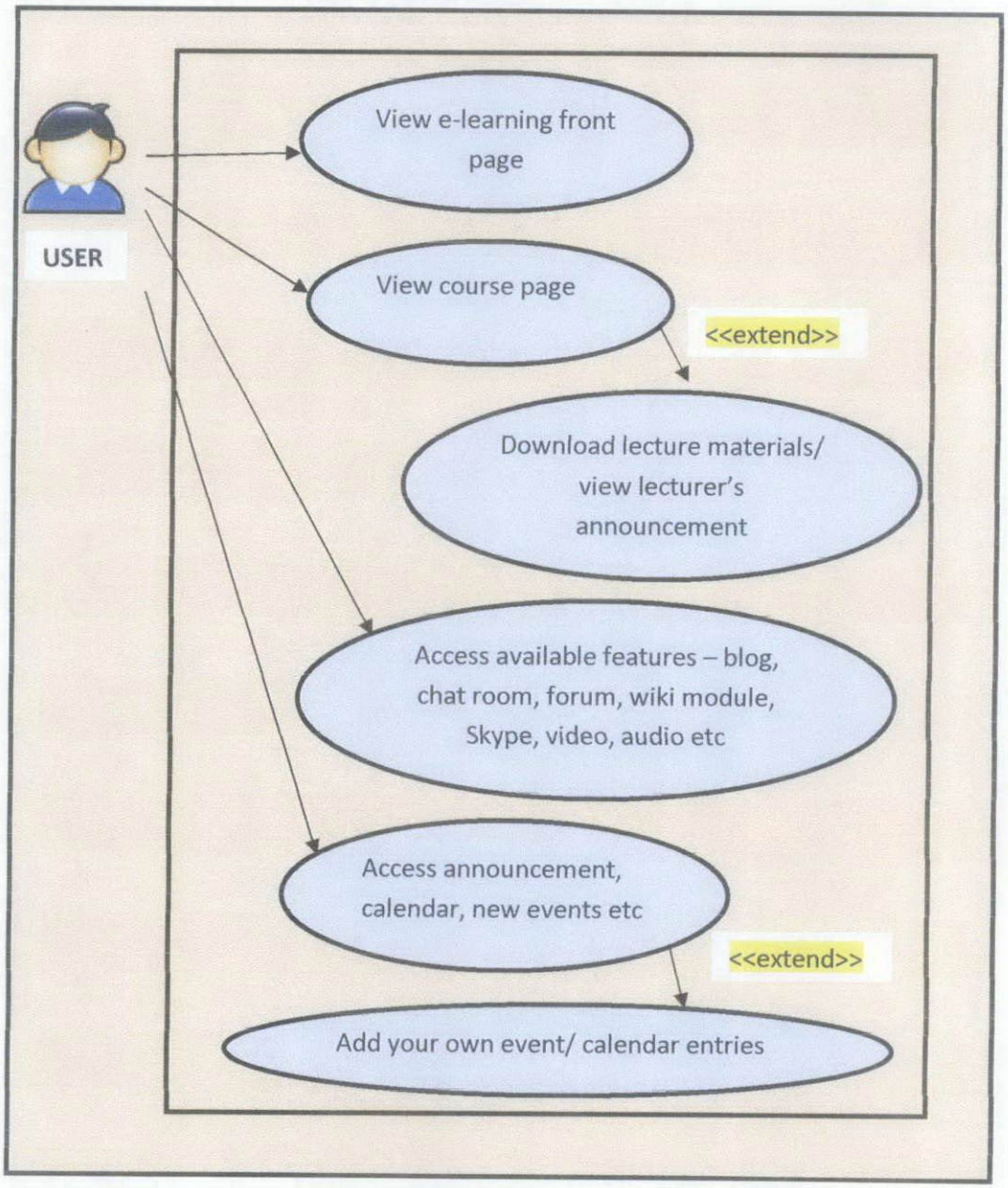


Figure above shows us the modules available for student users. After login, the e-learning automatically direct the user to the front page. From that, the user can choose whatever modules he/she wants for example course module where he/she can find so many accessible modules in that section.

4.7 FUNCTIONAL MODEL: FLOW DIAGRAM

Figure 4.20: Flow Diagram (by Mark Stevens)

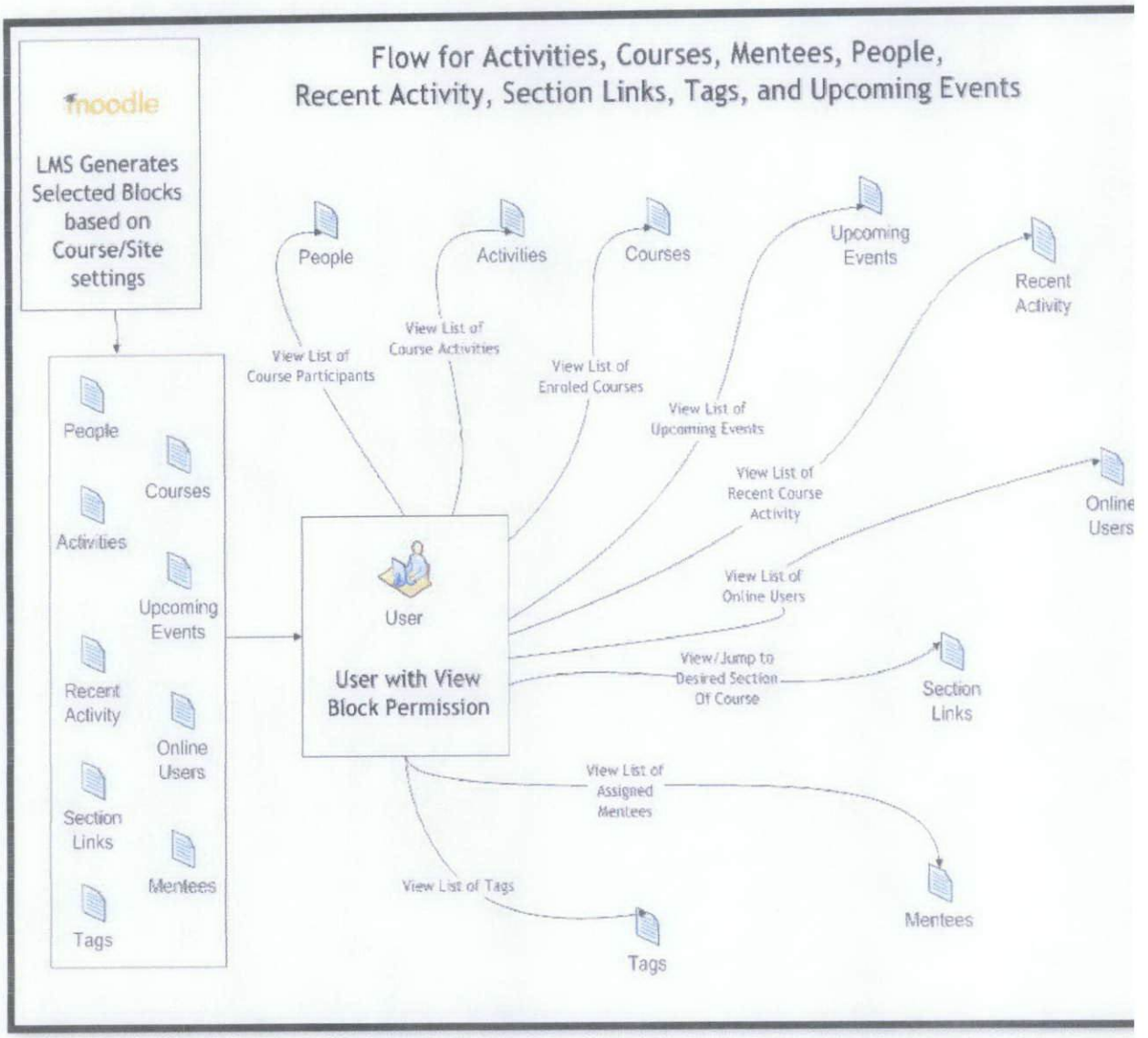


Figure above shows us about the flow of activities, courses, mentees, people, recent activity, section links, tags and upcoming event. Based on this diagram, when a user with view block permission clicks on 'View list of course participants', the system will display particular people from the database. It same goes to other modules as stated in the diagram.

Figure 4.21: Flow for Assignment diagram (by Mark Steven)

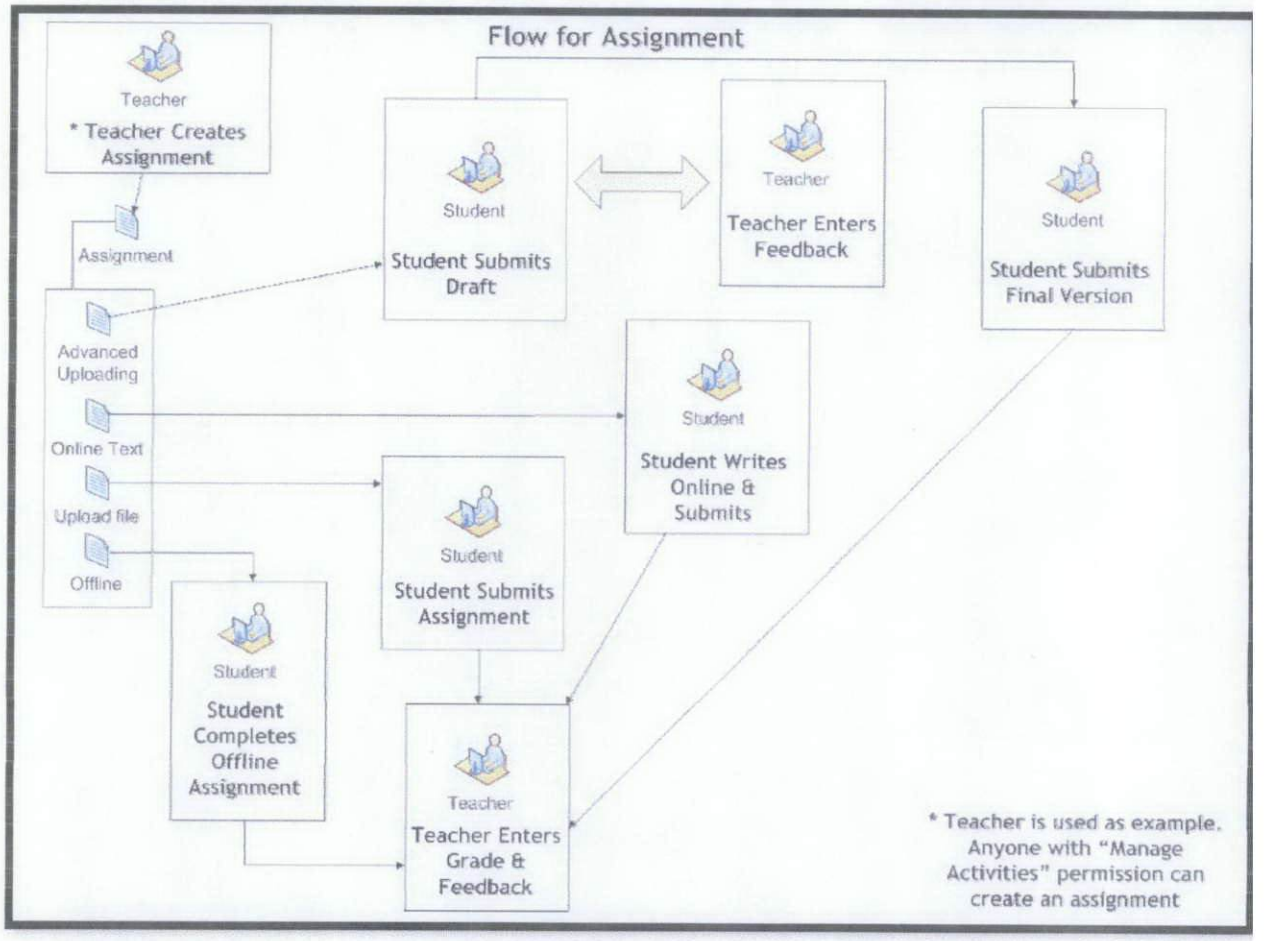


Figure above indicate the flow for assignment where the main actors in this event are teachers (lecturers) and students. The flow starts when the teacher creates assignment, and uploads it into e-learning. After that, students will download and complete the assignment and upload it again for online text.

4.8 SYSTEM ARCHITECTURE AND DEVELOPMENT TOOLS

Figure 4.22: Moodle system architecture

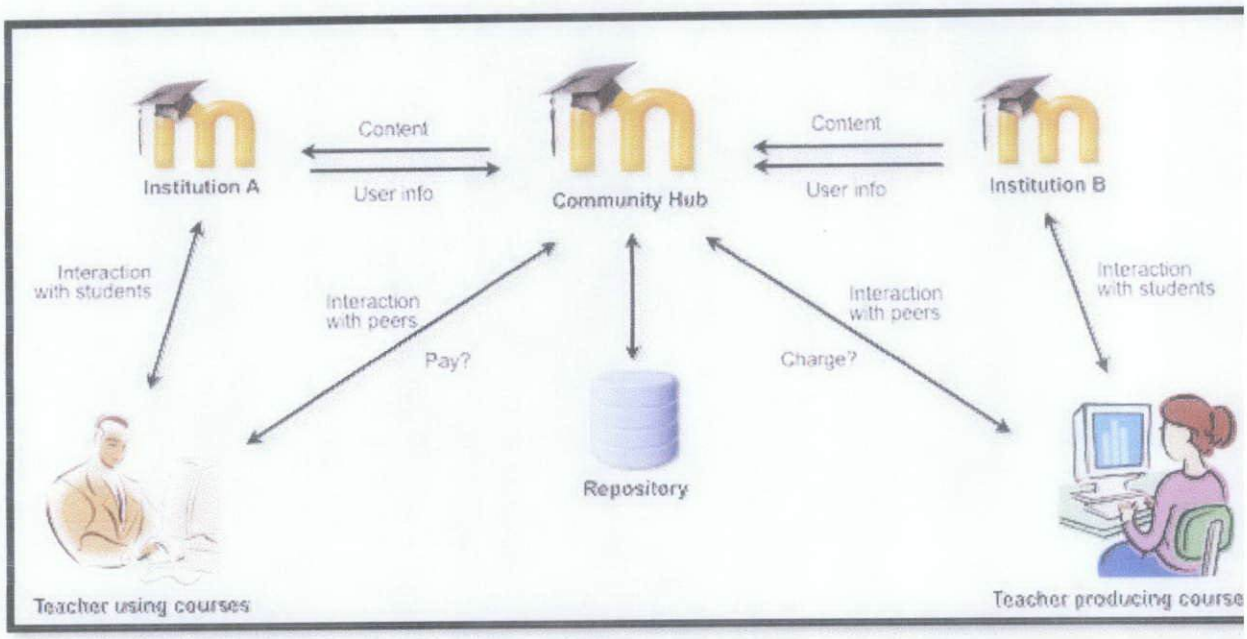


Figure above shows us the system architecture for the development of the system. This e-learning is using Moodle platform.

In order to build an e-learning using Moodle, first of all we need to install the AMP which stands for Apache, MySQL and PHP. Moodle is written in a scripting language called PHP and stores most of its data in a database. The recommended database is MySQL.

Requirements

Moodle is primarily developed in Linux using Apache, MySQL and PHP (also sometimes known as the LAMP platform). It is also regularly tested with Windows XP/2000/2003 (WAMP), Solaris 10 (Sparc and x64), Mac OS X and Netware 6 operating systems. Support for PostgreSQL, Oracle and Microsoft SQL Server is also available.

The requirements for Moodle are as follows:

Hardware

- ✓ Disk space: 160MB free (min).
- ✓ Memory: 256MB (min), 1GB (recommended). The general rule of thumb is that Moodle can support 50 *concurrent* users for every 1GB of RAM, but this will vary depending on specific hardware and software combination.
- ✓ This includes hosting limits of PHP or MySQL on a hosting service.
- ✓ The capacity can limit the number of users the Moodle site can handle.

Software

- ✓ Moodle requires a web server environment and will run in Apache and IIS easily. Moodle should run in any server environment that supports PHP.
- ✓ Moodle is written in the PHP scripting language. Currently, Moodle v 1.9.x requires a minimum of PHP v4.3.0 to run. Moodle 2.0 needs PHP v 5.2.8.
- ✓ Moodle will use MySQL, MSSQL, PostgreSQL or Oracle as a database, but no others. There is some real issues in the interoperability interface of different databases, which complicates the whole issue.

4.9 EXPERIMENTATION/MODELING

4.9.1 Expected User

- **Administrator** - Administrators, broadly speaking, engage in a common set of functions to meet the organization's goals. In an e-learning, administrator has full responsibility to ensure the successfulness of an e-learning.
- **Managers** - Managers can access course and modify them, they usually do not participate in courses.

- **Course creators** - Course creators can create new courses.
- **Lecturers** - Lecturers can do anything within a course, including changing the activities and grading students.
- **Students** - Students generally have fewer privileges within a course.
- **Guest** - Guests have minimal privileges and usually cannot enter text anywhere.

4.9.2 Modules available that support pedagogy and andragogy

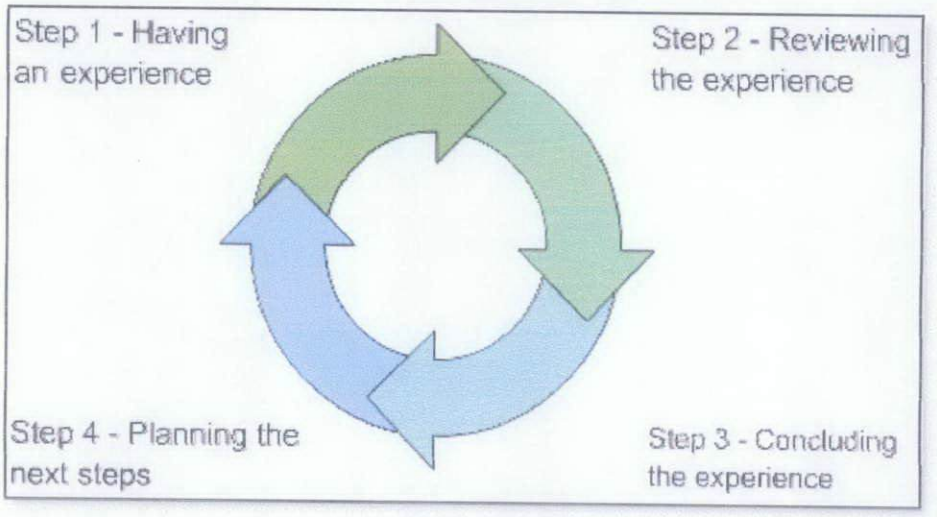
- **Pedagogy modules**
  1) Lesson module
  2) Resource
  3) Quiz module
  4) Assignment module
  5) Search engine
  6) Student portfolio
  7) Student tracking module

- **Andragogy modules**
  1) Chat module (message)
  2) Forum module
  3) Hyperlink module (to direct student to specific source)
  4) Glossaries
  5) Choices
  6) Surveys
  7) Workshops
  8) Wiki module

4.10 CURRENT ADULT LEARNING PROCESS

Adult learning is most effective through 'doing' that can be identified effectively as consisting of four stages.

Figure 4.23: Current Adult learning process [46]

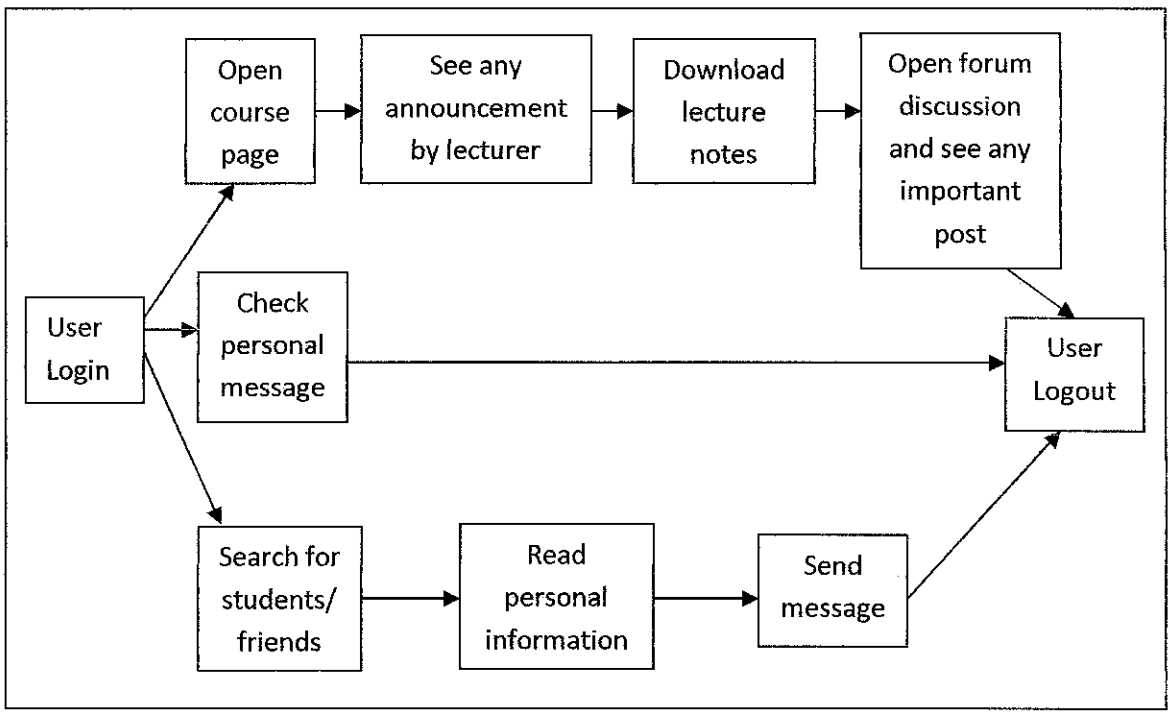


The learner can theoretically enter the circle at any point. Each of the above stages can be linked with a particular learning preference

Some people showed preferences for styles in specific areas ranging from very strong to very low, whereas others showed moderate preferences across the range. It has been discovered that some people in certain professional groups share a preference for a particular style.

4.11 CURRENT ADULT LEARNING PROCESS IN CURRENT CMS

Figure 4.24: Current adult learning process in current CMS



According to Figure 4.24, we can see that the adult user is using current e-learning only for a few limited actions such as looking for announcement, downloading lecture notes and some of them try to find their friend through the e-learning. The knowledge sharing between lecturer and students occurs rarely. Lecturers just need to post the lecture materials, and students only need to download it. Discussion over the forum also occurs very seldom. So, because of this situation, an improved e-learning has been designed and the learning processes in the improved CMS also get improved. Kindly see Figure 4.25 below.

4.12 IMPROVED CMS LEARNING PROCESS FOR ADULT

Figure 4.25: Improved CMS learning process for adult

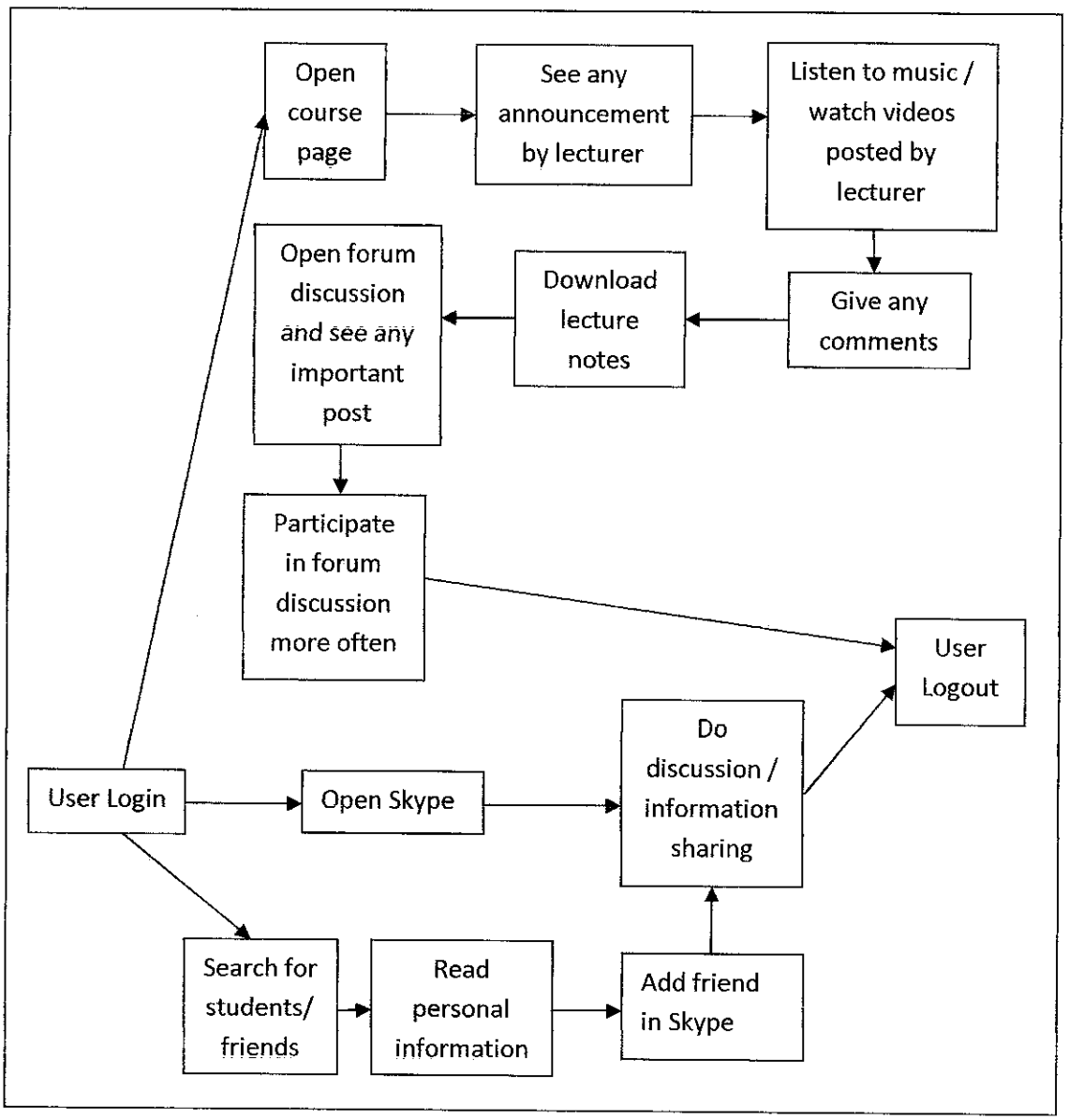


Figure 4.25 shows us the improved learning process in the enhanced e-learning (contains both pedagogical and andragogical learning theories). What we can see from the figure above is, adult users tend to communicate with each other in order to share and transfer knowledge.

Multimedia can be a powerful tool for adult education. When used effectively it can captivate an audience, tug emotions, maintain attention, and contextualize scenario-

based learning [47]. There are 6 benefits of integrating multimedia which are; ward off boredom, engage the sense, activate the imagination through storytelling, provide an alternative to statistics and data, utilize virtual guest lecturers and encourage self-directed learning [47].

4.13 FEATURES IN CMS

4.13.1 Features of Pedagogy in Current CMS (Moodle)

Table 4.2: Pedagogy features in current CMS (Moodle)

Features	Details
Assignment Module	Assignments can be specified with a due date and a maximum grade. Lecturers can specify when to be submitted, what format, the due date etc
Glossary Module	The Glossary module is one of the modules that best illustrate the way that Moodle can fundamentally improve upon the experience of a traditional classroom. When students contribute to a course in a public place like the glossary, their ideas are given weight and attention and often result in a greater pride or ownership of the assignment.
Lesson Module	A lesson is a single activity where a series of pages are presented to the student. Pages can allow students to make choices by their answers to questions or by selecting a button with a description. A student choice is also a link to another lesson page.
Quiz Module	Teachers can define a database of questions where they can add these questions to a course quiz or have the questions shared over the Moodle site. Quizzes are automatically graded, and can be re-graded if questions are modified.

Survey Module	Built-in surveys (COLLES, ATTLS) have been proven as instruments for analyzing online classes.
Workshop Module	Workshop module allows peer assessment of documents, and the teacher can manage and grade the assessment.

4.13.2 Andragogical Features that Support Adult Learning Theories Better (Moodle)

Table 4.3: Andragogical features that support adult learning (Moodle)

Features	Details
Chat Module	The Chat module allows smooth, synchronous text interaction. Includes profile pictures in the chat window.
Choice Module	The Choice module is like a single question poll. Can either be used to vote on something, or to get feedback from every student. Students can optionally be allowed to see an up-to-date graph of results.
Forum Module	Different types of forums are available, such as teacher-only, course news, open-to-all, and one-thread-per-user. There are several options for emailing forum posts to members of the course. All administration tasks can be done by lecturers to control the forum.
Wiki Module	Wiki module is a series of web pages that anyone can add to or edit. It enables document pages to be authored collectively and it supports group collaboration.
Skype Module	Skype plug-in can make this e-learning better and attractive. Skype invites lecturers and students to collaborate on a project, and share skills and inspiration around specific teaching needs. Teachers all over the world are using Skype to make learning more exciting and memorable. It's easy to see why: Skype offers an immediate way to help students discover new cultures, languages and ideas, all without leaving the classroom [18]

Audio and Video Module	In order to make this e-learning more attractive, multimedia plug-ins such as video and audio have been enabled. Multimedia can stimulate more than one sense at a time, and in doing so, may be more attention-getting and attention-holding [16].
Blog Module	A blog (a blend of the term *web log*) is a type of website or part of a website. Blogs are usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video. Entries are commonly displayed in reverse-chronological order. *Blog* can also be used as a verb, meaning *to maintain or add content to a blog*

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

This report introduced how to develop an e-learning that contains both pedagogical and andragogical learning theories. There is a need to develop this kind of e-learning because, students are using e-learning to interact with each other and also with their lecturer. The e-learning that is developed promotes the features that support both learning theories, thus can enhance learning environment. This e-learning has been developed using Moodle platform, open source software that is specialized in Course Management Systems (CMS). There are a few software come along with Moodle package which are XAMPP, Apache and MySQL. The methodology that has been used in this project is ADDIE Model which stands for Analysis, Design, Development, Implementation and Evaluation. Furthermore, it is believed that the new system will bring positive return towards the betterment of the UTP society. Through survey, the need for this kind of e-learning has been supported by high number of participants agreed to have the e-learning implemented. Hence, framework of the system has been presented which include use case diagram, flow diagram and screenshot of the e-learning. The benefits of this e-learning is to provide an attractive learning environment to higher educational institution students and lecturers. An added value of this e-learning would be that the users will feel like want to use e-learning as a method in information seeking frequently. As the conclusion, this e-learning has been developed to fulfill the actual needs in learning environment.

5.2 RECOMMENDATIONS

Introducing the internet to schools and spending vast resources to wire almost all of our classrooms have both inspired and frustrated science teachers who struggle to take advantage of its many promises. Time and time again educators have been promised great advances from new technologies.

Course management systems represent the ideal marriage of technology and actual classroom instruction, offering many advantages to instructors. When the system is installed properly and fully, with firewalls resolved, students have access to their courses via home computers or any computer with Web access. These systems provide a great aide for increasing communication. The student can view and review the teacher's assignment and instructions for completing it as often as needed. The communication improvement will prove obvious to any teacher who has ever repeated instructions five times and still gotten clarification questions.

CMSs are relatively similar in their features. If one institution gets more value from having a CMS than another institution does, it's probably because the faculty and students at the first institution make better use of the CMS's capabilities. One powerful way for a system, institution, department or faculty member to get more value from a CMS is to study what's happened so far, as a way of identifying barriers that can be lowered and opportunities that can be exploited.

The recommendation for future e-learning enhancement will be to conduct research to enhance the speed of the e-learning, so the system can run smoothly on slow internet connection. A further research on andragogy features will be carried out in order to improve the e-learning, to make it more reliable and dependable. Last but not least, this e-learning can be enhanced to encourage students to use e-learning as the method to retrieve and transfer knowledge.

REFERENCES

[1] Hanson, P. and Robson, R., "An evaluation framework for course management technology", EDUCAUSE Center for Applied Research, vol. 14, 2003.

[2] Pew, S., "Andragogy and pedagogy as foundational theory for student motivation in higher education", Insight Journal, Park University, 2007.

[3] Diana M. L. Wong, "Andragogical approach for course management systems evaluation", International Conference on Networking and Information Technology (ICNIT), Shanghai, 22-24 June 2010.

[4] Knowles, M., Elwood, F.H. III, and Richard, A.S, "The adult learner", 4th Edition, Houston: Gulf Publishing, 1998.

[5] Meerts, J., "Course Management Systems", EDUCAUSE Evolving Technologies Committee, 2003.

[6] Castagnolo, C., "The ADDIE Model: Why Use It?" ,Articlebase: Free Online Article Directory, 2008.

[7] Branson, R. K., Rayner, G. T., Cox, J. L., Furman, J. P., King, F. J., Hannum, W. H. (1975). *Interservice procedures for instructional systems development.* (5 vols.) (TRADOC Pam 350-30 NAVEDTRA 106A). Ft. Monroe, VA: U.S. Army Training and Doctrine Command, August 1975. (NTIS No. ADA 019 486 through ADA 019 490).

[8] K, Kruse, "Introduction to Instructional Design and the ADDIE Model", Chief Learning Officer and President of AXIOM Professional Health Learning, 2010

[9] Dr. Sandra Ratcliff Daffron, "Andragogy VS Pedagogy", 2003.

[10] Atherton, J. S., "Learning and teaching: Knowles' Andragogy: An angle on adult learning", 2005.

[11] Foley, G., "Understanding Adult Education and Training", 2nd edition, pg. 46-47, 2000.

[12] Sutherland, P., "Adult Learning: a Reader", Kogan Page Limited, pg. 30-31, 2007.

[13] Jarvis, P., "Adult Education and Lifelong Learning", 3rd Edition, RoutledgeFalmer Publishing, pg. 68-82, 2004.

[14] Telania Inc, "Course Management System", 2010.

[15] Login, Wikipedia the free Encyclopedia, [online] 2011, http://en.wikipedia.org/wiki/Login (Accessed: 22nd April 2011)

[16] Benefits of Media in Learning, [online] 2008, http://www.athensacademy.org/instruct/ media_tech/reeves0.html (Accessed: 24th March 2011)

[17] Multimedia in Learning, [online] 2009, http://hrsbstaff.ednet.ns.ca/engramja/ gradcourse/multimedia/benefits_of_multimedia.htm (Accessed: 1st April 2011)

[18] About Skype in the classroom, Education Skype, [online] 2011, http://education.skype.com/about (Accessed: 12th April 2011)

[19] Features, Moodle Document, [online] 2011, http://docs.moodle.org/en/Features# Enrolment (Accessed: 2nd April 2011)

[20] Why Use a Course management System, Blackboard, Office of Information Technology, [online] 2011, http://www.princeton.edu/bb/whycms/ (Accessed: 4th April 2011)

[21] EduTools Features, EduTools, http://www.edutools.info/feature_list.jsp?pj=4 (Accessed: 23rd April 2011)

[22] Student E-Learning, University Technology of PETRONAS, http://elearning.utp.edu.my (Accessed: 2nd February 2011)

[23] Learning Management System, Wikipedia the Free Encyclopedia, http://en.wikipedia.org/wiki/Learning_management_system (Accessed: 12th February 2011)

[24] Almarashdeh, I. A., "The Success of Learning Management System Among Distance Learners in Malaysian Universities", Faculty of Information Science and Technology, National University of Malaysia, Selangor, MALAYSIA, 2005-2010.

[25] Morgan, G., "Faculty Use of Course Management Systems", ECAR Key Findings, page 2, May 2003.

[26] Abdul Rashid, N., Majid, O., Shiao Yen, C., "E-Learning Management System for Secondary School in Malaysia", October 2002.

[27] Gelman, R. & Brown, A. L. (1986) Changing views of cognitive competence in the young. In N. Smelser & D. Gerstein (eds) Discoveries and Trends in Behavioural and Social Sciences. Washington DC: National Academy Press, pp. 175-207

[28] Clay, M. M. (1998) By Different Paths to Common Outcomes. York, Maine: Stenhouse

[29] Hill, S., Comber, B., Louden, W., Rivalland, J. & Reid, J. (1998) 100 Children Go to School. DETYA, Canberra ACT: Commonwealth of Australia.

[30] Quinn, E, "Information Seeking Behaviour of Students using Technology", Info 511, Drexel University, August 2004.

[31] Thórsteinsdóttir, Gudrún (2001) "Information-seeking behaviour of distance learning students". Information Research, **6**(2) Available at: http://InformationR.net/ir/6-2/ws7.html

[32] Holmberg, Börje (1995)Theory and Practice of Distance Education. Second edition, London, Routledge

[33] Gardner, H., "Multiple Intelligence", 1993.

[34] Kolb, D. A, "Experiential Learning", 1975.

[35] Blackboard Learning System, Wikipedia the free Encyclopedia, [online] 2011, http://en.wikipedia.org/wiki/Blackboard_Learning_System (Accessed: 3rd April 2011)

[36] Web-based Multimedia Development, Reflection, Development Process, [online] 2011, http://mpt1393nurfazilasalleh.blogspot.com/p/reflection-development-process.html (Accessed: 29th April 2011)

[37] Moodle (2003) IMS Learning Design. http://moodle.org/mod/forum/discuss.php?d=3758 (Accessed: 1st May 2011)

[38] Moodle (2004a) SCORM content packages. http://moodle.org/mod/forum/discuss.php?d=1926 (Accessed: 1st may 2011)

[39] Dougiamas, M. (1998) A journey into constructivism. http://dougiamas.com/writing/constructivism.html (Accessed 1st May 2005)

[40] Moodle (2005a) Learning Design book study. http://moodle.org/course/view.php?id=44 (Accessed: 1st May 2011)

[41] Koper, R., "Chapter 1. An introduction to Learning Design. In Koper & Tattersal (Eds.) Learning Design", Pp. 3-20. Berlin: Springer-Verlag (2005).

[42] Belanger, Y., "Summary of fall 2003 Blackboard survey results", Blackboard.duke.edu/pdf/Bb_ survey_report_f2003.pdf, 2004

[43] Bowdoin College (2005). www.bowdoin.edu/it/erd/blackboard/pedagogy/files/bb-StudentSatisfaction.ppt (Accessed: 1st may 2011)

[44] Bhagyayati EE, Kurkovsky S, "Whitehead CC (2005) Using asynchronous discussions to enhance student participation in CS courses", ACM SIGCSE Bulletin 37(1):111-115.

[45] Leslie, S., Landon, B., Poulin, R., "Learning Object Repository Software", WCET's EduTools, November 12, 2004.

[46] Styles of Learning, HSC StudentNet, http://hsc.uwe.ac.uk/net/student/default.aspx?pageid=158 (Accessed: 1st may 2011)

[47] Integrating Multimedia into Adult Education: Is it Worth all the Trouble?, The Institute for Technology and Social Change, http://techchange.org/2011/03/04/integrating-multimedia-into-adult-education-is-it-worth-all-the-trouble/ (Accessed: 1st may 2011)

[48] Dougiamas, M., "Improving the effectiveness of tools for Internet based education", 2000.

APPENDIX 1

Survey Questions for University Students

Survey Questionnaire (for universities students)

This survey is intended to assist the study of **information seeking behavior and existing Course Management System (e-Learning).** Read each question and indicate your answer that best describe your experience. There are altogether **24 QUESTIONS**. There is no right or wrong answers. Your time and assistance is greatly appreciated. Thanks!

Section A (Demographic)

1. Please indicate your current enrollment status:
   - A. Full-time graduate student
   - B. Part-time graduate student
   - C. Full-time undergraduate student
   - D. Part-time undergraduate student
   - E. Others:

     Please specify: _____
2. What degree have you enrolled for?
   - A. Science and Technology
   - B. Business and Administration
   - C. Education and Languages
   - D. Applied Social Sciences
   - E. Engineering
   - F. Others:

     Please specify: _____
3. Which year are you in?
   - A. 1st Year
   - B. 2nd Year
   - C. 3rd Year
   - D. 4th Year
   - E. 5th Year
   - F. Others:

     Please specify: _____
4. What is your gender?
   - A. Female
   - B. Male
5. What is your marital status?
   - A. Single
   - B. Married

Section B (Infrastructure)

6. Do you have internet connection at your hostel?
   A. Yes
   B. No

7. Where do you most frequently access the internet to access e-Learning?
   A. Hostel
   B. Library
   C. Friend's laptop
   D. Do not need internet
   E. Others:
      Please specify:_____

8. What are the difficulties encountered when seeking for information for your studies? (Check all that apply)
   A. Poor/ slow internet connection
   B. Too much information to scan
   C. Difficult to download reference materials
   D. Specific information not available
   E. Others:
      Please specify: _____

Section C (Information Sources and Channels)

9. How often do you need to look for information for your subjects taken?
   A. Daily
   B. Weekly
   C. Monthly
   D. Quarterly

10. What is the most referred information for the online or distance education classes? Please rank (1st - 8th) according to importance.
    A. Government information _____
    B. Current issues _____
    C. Technical information _____
    D. Medical information _____
    E. Leisure information _____
    F. Sports information _____
    G. Social information _____
    H. Economic/ Business information _____
    I. Science information _____
    J. Others: _____
       Please specify: _____

11. Approximately how many hours do you spend looking for information for your subjects in a week?
    A. 0 – 5 hours
    B. 6 – 10 hours
    C. 11 – 15 hours
    D. 16 – 20 hours
    E. 21 hours and above

12. Where do you usually look for information? (Check all that apply)
    A. Textbook assigned to the course
    B. Handouts from the lecturer/ professor
    C. Online database
    D. Library books
    E. Journal articles
    F. Ask library staff
    G. World Wide Web (WWW)
    H. Newspapers
    I. Others:
        Please specify: _____

13. Which search engine do you use most often for class research? (Check all that apply)
    A. Google
    B. Google Scholar
    C. Yahoo!
    D. MSN
    E. Scirus
    F. Others:
        Please specify: _____

14. What kind of software or technologies does the institution provide to assist your study, if any? (Check all that apply)
    A. Blackboard
    B. WebCT
    C. Moodle
    D. Instant Messenger
    E. Others:
        Please specify: _____

Section D (Course Management System / e-Learning)

15. How interesting is your higher educational institution e-Learning?
    A. Very interesting
    B. Interesting
    C. Normal
    D. Not interesting
    E. Very boring

16. What are the common features included in that e-Learning you use the most?
    A. Course page (to download lecture notes etc)
    B. Discussion forum
    C. To do list
    D. Announcement box
    E. Others:
        Please specify: _____

17. Do you think is there any feature that can support two-way communication between facilitators and learners?
    A. Yes. Please state:_____
    B. No

18. When is the time the e-Learning become so useful?
    A. When to download lecture notes
    B. When to check discussion forum
    C. When to look for announcement
    D. When to take online test/quizzes
    E. When to submit assignment online
    F. When to chat with other members

19. How often do you access the e-Learning in a day? Why?
    A. 3-4 times a day
    B. 1-2 times a day
    C. 1 time in 2 days
    D. 1 times in 4 days
    E. 1 times a week
    F. Other:
        Please specify: _____

20. What are the features do you think can benefit both students and lecturers? (can be existing or new features)
    A. Discussion forum
    B. Chat room
    C. Course page
    D. Others :
        Please specify: _____

21. What do you expect the most from the e-Learning?
    A. To get lecture notes
    B. To do discussion between lecturers and students
    C. Can become a very interactive learning environment
    D. Other
        Please specify: _____

22. Additional feature(s) do you think is suitable to be added to the existing CMS (e-Learning)?
        Please specify: _____

Section E (Motivation and Satisfactory Level)

23. How do you rank the importance of the following information sources, when in different phases of any research assignment/ project – Task Initiation, Topic Selection, Pre-focus Exploration, Focus Formulation, Information Collection, and Closure/ Presentation? Circle the 1-5 response scale where,
    1 = Unimportant

    2 = Of Little Importance

    3 = Moderately Important

    4 = Important

    5 = Very Important

	Info Source	Initiation	Selection	Exploration	Formulation	Collection	Presentation
	Textbook	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Lecture Notes	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Online Database	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Library Books	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Journal Articles	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Ask Library Staff	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	World Wide Web	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
	Newspapers	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

24. How confident are you that you can find information that you need on your research topic when in each of these phases - Task Initiation, Topic Selection, Pre-focus Exploration, Focus Formulation, Information Collection, and Closure/ Presentation? Circle the 1-5 response scale where,
1 = Least Confident

2 = Below Confident

3 = Neutral

4 = Confident

5 = Very Confident

Information Seeking Stages	**Confidence Level**				
Initiation	1	2	3	4	5
Topic Selection	1	2	3	4	5
Exploration	1	2	3	4	5
Formulation	1	2	3	4	5
Collection	1	2	3	4	5
Presentation	1	2	3	4	5

APPENDIX 2

Survey Questions for Distance Learners

Survey Questionnaire (for distance learners)

This survey is intended to assist the study of **information seeking behavior and existing Course Management System (e-Learning).** Read each question and indicate your answer that best describe your experience. There are altogether **33 QUESTIONS**. There is no right or wrong answers. Your time and assistance is greatly appreciated. Thanks!

Section A (Demographic)

1. Please indicate your current enrollment status:
   A. Full-time graduate student
   B. Part-time graduate student
   C. Full-time undergraduate student
   D. Part-time undergraduate student
   E. Others:
      Please specify: _____

2. What degree have you enrolled for?
   A. Science and Technology
   B. Business and Administration
   C. Education and Languages
   D. Applied Social Sciences
   E. Engineering
   F. Others:
      Please specify: _____

3. Which year are you in?
   A. 1st Year
   B. 2nd Year
   C. 3rd Year
   D. 4th Year
   E. 5th Year
   F. Others:
      Please specify: _____

4. How many online or distance education classes have you taken?
   A. 0 – 5
   B. 6 – 10
   C. 11 – 15
   D. 16 – 20
   E. 20 and above

5. What is your gender?
   A. Female
   B. Male

6. Please select your age range from among the following choices:
   A. 18 – 24
   B. 25 – 34
   C. 35 – 44
   D. 45 – 54
   E. 55 and above

7. What is your marital status?
   A. Single
   B. Married

8. What is your occupation?
   A. Engineer
   B. Business
   C. Doctor/ Physicians/ Pharmacist
   D. Education
   E. Lawyer
   F. IT Professionals
   G. Unemployed
   H. Others:

   Please specify: _____

9. How far do you live from the university?
   A. 0 – 10km
   B. 11 – 20km
   C. 21 – 30km
   D. 31km and above

Section B (Infrastructure)

10. Do you have Internet connection at home?
    A. Yes
    B. No

11. Where do you most frequently access the Internet for class?
    A. Home
    B. Office
    C. Library
    D. Do not need Internet
    E. Others:

    Please specify: _____

12. What is your main reason for visiting the public/ institution's library? (Check all that apply)
    A. To study
    B. Borrow books
    C. To use the computers
    D. Browsing the shelves
    E. Searching the online public access catalogue (OPAC)
    F. Use of the reference material
    G. Photocopying
    H. Leisure reading
    I. To read newspapers
    J. To read/ photocopy from printed journals
    K. Others:
    Please specify: _____

13. What assistance have you received while using the public/ institution's library and its resources? (Check all that apply)
    A. Orientation tour
    B. Course-related instruction
    C. Individual assistance at the reference desk
    D. Printed instructions
    E. Individual appointment with a librarian
    F. Help from friends or colleagues
    G. None
    H. Others:
    Please specify: _____

14. If not, why you do not use the library?
    A. Unaware of it
    B. No need to
    C. Insufficient reference material
    D. Difficulty in using it
    E. Others:
    Please specify: _____

15. What are the difficulties encountered when seeking for information for your studies? (Check all that apply)

    A. Poor/ slow internet connection
    B. Too much information to scan
    C. Difficult to download reference materials
    D. Specific information not available
    E. Others:
    Please specify: _____

Section C (Information Sources and Channels)

16. How often do you need to look for information for your classes?
    A. Daily
    B. Weekly
    C. Monthly
    D. Quarterly

17. What is the most referred information for the online or distance education classes? Please rank (1st - 8th) according to importance.
    A. Government information _____
    B. Current issues _____
    C. Technical information _____
    D. Medical information _____
    E. Leisure information _____
    F. Sports information _____
    G. Social information _____
    H. Economic/ Business information _____
    I. Science information _____
    J. Others: _____
    Please specify: _____

18. Approximately how many hours do you spend looking for information for your online or distance education classes in a week?
    A. 0 – 5 hours
    B. 6 – 10 hours
    C. 11 – 15 hours
    D. 16 – 20 hours
    E. 21 hours and above

19. Where do you usually look for information? (Check all that apply)
    A. Textbook assigned to the course
    B. Handouts from the lecturer/ professor
    C. Online database
    D. Library books
    E. Journal articles
    F. Ask library staff
    G. World Wide Web (WWW)
    H. Newspapers
    I. Others:
    Please specify: _____

20. Which search engine do you use most often for class research? (Check all that apply)
    A. Google
    B. Google Scholar
    C. Yahoo!
    D. MSN
    E. Scirus
    F. Others:
        Please specify: _____

21. Do your online or distance education classes require you to do research outside of the class?
    A. Yes
    B. No

22. What kind of software or technologies does the institution provide to assist your study, if any? (Check all that apply)
    A. Blackboard
    B. WebCT
    C. Moodle
    D. Instant Messenger
    E. Others:
        Please specify: _____

23. Do you use bibliographic software (e.g. EndNote or RefWorks)?
    A. Yes
        If Yes, which software do you use? (Check all that apply)

        a. Bibtex
        b. EndNote
        c. ProCite
        d. RefWorks
        e. Others:
            Please specify: _____

    B. No

Section D (Course Management System / e-Learning)

24. How interesting is your higher educational institution e-Learning?
    A. Very interesting
    B. Interesting
    C. Normal
    D. Not interesting
    E. Very boring

25. What are the common features included in that e-Learning you use the most?
    A. Course page (to download lecture notes etc)
    B. Discussion forum
    C. To do list
    D. Announcement box
    E. Others:
       Please specify: _____

26. Do you think there is any feature that can support two-way communication between facilitators and learners?
    A. Yes. Please state:_____
    B. No

27. When is the time the e-Learning become so useful?
    A. When to download lecture notes
    B. When to check discussion forum
    C. When to look for announcement
    D. When to take online test/quizzes
    E. When to submit assignment online
    F. When to chat with other members

28. How often do you access the e-Learning in a day? Why?
    A. 3-4 times a day
    B. 1-2 times a day
    C. 1 time in 2 days
    D. 1 times in 4 days
    E. 1 times a week
    F. Other:
       Please specify: _____

29. What are the features do you think can benefit both students and lecturers? (can be existing or new features)
    A. Discussion forum
    B. Chat room
    C. Course page
    D. Others : Please specify: _____

30. What do you expect the most from the e-Learning?
    A. To get lecture notes
    B. To do discussion between lecturers and students
    C. Can become a very interactive learning environment
    D. Other
       Please specify: _____

31. Additional feature(s) do you think is suitable to be added to the existing CMS (e-Learning)?
       Please specify: _____

Section E (Motivation and Satisfactory Level)

32. How do you rank the importance of the following information sources, when in different phases of any research assignment/ project – Task Initiation, Topic Selection, Pre-focus Exploration, Focus Formulation, Information Collection, and Closure/ Presentation? Circle the 1-5 response scale where,
    1 = Unimportant

    2 = Of Little Importance

    3 = Moderately Important

    4 = Important

    5 = Very Important

Info Source	Initiation	Selection	Exploration	Formulation	Collection	Presentation
Textbook	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Lecture Notes	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Online Database	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Library Books	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Journal Articles	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Ask Library Staff	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
World Wide Web	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Newspapers	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

33. How confident are you that you can find information that you need on your research topic when in each of these phases - Task Initiation, Topic Selection, Pre-focus Exploration, Focus Formulation, Information Collection, and Closure/ Presentation? Circle the 1-5 response scale where,
1 = Least Confident

2 = Below Confident

3 = Neutral

4 = Confident

5 = Very Confident

Information Seeking Stages	**Confidence Level**				
Initiation	1	2	3	4	5
Topic Selection	1	2	3	4	5
Exploration	1	2	3	4	5
Formulation	1	2	3	4	5
Collection	1	2	3	4	5
Presentation	1	2	3	4	5

APPENDIX 3

Survey Results

University Technology of Petronas

Course		Science and Technology (Total = 12 students)	Engineering (Total = 24 students)	Total	Percentage (%)
Section A *Demographic* 1) Enrollment status	Full-time undergraduate	12	24	36	100%
	Part-time undergraduate	0	0	0	0%
2) Marital status	Single	12	24	36 0	100%
	Married	0	0	0	0%
Section B *Infrastructure* 1) Internet status	Available	12	24	36	100%
	Not available	0	0	0	0%
2) e-Learning access	Hostel	12	24	36	100%
3)Difficulties encountered	Poor internet connection	9	18	27	75%
	Too much information to scan	3	0	3	8.30%
	Specific information not available	0	6	6	16.67%
Section C *Information Sources and Channels* 1) Looking for information for subjects taken	Weekly	12	21	33	91.67%
	Daily	0	3	3	8.33%
2) Preferred information					

(The lowest value is the most preferred information)	Government information	84	168	252	
	Current issues	72	132	204	
	Technical information	27	72	99	
	Medical information	81	147	228	
	Leisure information	45	120	165	
	Sports information	51	102	153	
	Social information	57	114	171	
	Economic/Business Information	78	156	234	
	Science Information	42	84	126	
	Others	0	0	0	
3) Hours spend looking for information	0-5	9	17	26	72.22%
	6-10	3	7	10	27.78%
	11-15	0	0	0	0%
	16-20	0	0	0	0%
	>21	0	0	0	0%
4) Preferred information sources	World Wide Web	12	24	36	
	Library books	9	18	27	
	Handout from lecturer	9	18	27	
	Textbooks assigned to the course	3	4	7	
	Online database	3	5	8	
5) Favourite search engine	Google	12	24	36	
6) Software used to assist study	Moodle	9	24	33	

	Instant Messenger	3	15	18	
Section D *Course Management System/e-Learning* 1) About e-Learning	Normal	6	18	24	66.67%
	Very boring	6	6	12	33.33%
2) Preferred section	Course page	12	24	36	100%
	Others	0	0	0	0%
3) Feature can support two-way communication	Forum	12	21	33	
	Instant Messaging	7	6	13	
	Email				
4) The time when e-Learning become so useful	When to download lecture notes	6	20	26	
	When to look for announcement	6	6	12	
5) Expectation from e-Learning	To get lecture notes	6	18	24	66.67%
	Can become more interactive	6	6	12	33.33%
Section E *Motivation and Satisfactory Level*					

1) The importance of the following information resources					
	Textbook				
	Initiation	30	60		
	Selection	36	72		
	Exploration	33	66		
	Formulation	39	78		
	Collection	30	60		
	Presentation	33	66		
		201	**402**	603	11.20%
	Lecture notes				
	Initiation	42	84		
	Selection	42	84		
	Exploration	48	50		
	Formulation	42	34		
	Collection	30	70		
	Presentation	42	98		
		246	**420**	666	12.37%
	Online database				
	Initiation	33	74		
	Selection	30	53		
	Exploration	36	79		
	Formulation	30	56		
	Collection	42	99		
	Presentation	33	86		
		204	**447**	651	12.08%
	Library books				
	Initiation	30	73		
	Selection	39	81		
	Exploration	45	121		
	Formulation	39	58		
	Collection	27	53		
	Presentation	30	78		
		210	**464**	674	12.52%

	Journal articles				
	Initiation	33	71		
	Selection	39	96		
	Exploration	39	103		
	Formulation	39	142		
	Collection	30	80		
	Presentation	39	91		
		219	**583**	802	14.89%
	Ask library staff				
	Initiation	24	51		
	Selection	24	52		
	Exploration	24	64		
	Formulation	18	43		
	Collection	24	77		
	Presentation	24	62		
		138	**349**	487	9.04%
	Wold Wide Web				
	Initiation	51	112		
	Selection	51	132		
	Exploration	48	120		
	Formulation	54	134		
	Collection	48	110		
	Presentation	54	125		
		306	**733**	1039	19.29%
	Newspaper				
	Initiation	24	56		
	Selection	24	43		
	Exploration	24	44		
	Formulation	24	78		
	Collection	27	43		
	Presentation	21	55		
		144	**319**	463	8.60%
				5385	

Course		Science and Technology (Total = 3 students)	Business and Administration (Total = 2 students)	Total	Percentage (%)
Section A *Demographic* 1) Enrollment status	Full-time undergraduate	3	2	5	100%
	Part-time undergraduate	0	0	0	0%
2) Marital status	Single	3	2	5	100%
	Married	0	0	0	0%
Section B *Infrastructure* 1) Internet status	Available	3	2	5	100%
	Not available	0	0	0	0%
2) e-Learning access	Hostel	3	2	5	100%
3)Difficulties encountered	Poor internet connection	1	0	1	20%
	Too much information to scan	0	0	0	0.00%
	Specific information not available	2	2	4	80.00%
Section C *Information Sources and Channels* 1) Looking for information for subjects taken	Weekly	2	2	4	80.00%
	Daily	1	0	1	20.00%

2) Preferred information (The lowest value is the most preferred information)	Government information Current issues	24	16	40	
	Technical information	12	8	20	
	Medical information	18	12	30	
	Leisure information	23	12	35	
	Sports information	15	10	25	
	Social information	9	6	15	
	Economic/Business Information	21	14	35	
	Science Information	6	4	10	
	Others	0	0	0	
3) Hours spend looking for information	0-5	2	2	4	80.00%
	6-10	0	0	0	0%
	11-15	0	0	0	0%
	16-20	1	0	1	20%
	>21	0	0	0	0%
4) Preferred information sources	World Wide Web	2	2	4	80%
	Library books	0	0	0	0%
	Handout from lecturer	1	0	1	20%
	Textbooks assigned to the course	0	0	0	0%
	Online database	0	0	0	0%
5) Favourite search engine	Google	3	2	5	100%

6) Software used to assist study	Moodle				
	Instant Messenger				
Section D *Course Management System/e-Learning* 1) About e-Learning	Normal	1	2	3	60.00%
	Interesting	2	0	2	40.00%
	Very boring	0	0	0	0.00%
2) Preferred section	Course page	3	2	5	100%
	Others	0	0	0	0%
3) Feature can support two-way communication	Forum	3	2	5	100%
	Instant Messaging	0	0	0	0%
	Email				
4) The time when e-Learning become so useful	When to download lecture notes	3	2	5	100%
	When to look for announcement	0	0	0	0%
5) Expectation from e-Learning	To get lecture notes	3	2	5	100.00%
	Can become more interactive	0	0	0	0.00%
Section E *Motivation and Satisfactory Level* 1) The importance of the following information resources	***Textbook***				

Initiation	5	11	16	
Selection	3	12	15	
Exploration	4	4	8	
Formulation	6	12	18	
Collection	7	13	20	
Presentation	5	12	17	
			94	11.77%
Lecture notes				
Initiation	10	20	30	
Selection	10	19	29	
Exploration	9	19	28	
Formulation	8	17	25	
Collection	10	16	26	
Presentation	9	18	27	
			165	20.68%
Online database				
Initiation	2	6	8	
Selection	3	7	10	
Exploration	4	5	9	
Formulation	2	8	10	
Collection	3	3	6	
Presentation	5	4	9	
			52	6.52%
Library books				
Initiation	10	20	30	
Selection	7	17	24	
Exploration	6	16	22	
Formulation	6	19	25	
Collection	3	18	21	
Presentation	8	11	19	
			141	17.67%
Journal articles				
Initiation	4	15	19	

Selection	2	14	16	
Exploration	5	14	19	
Formulation	2	16	18	
Collection	3	11	14	
Presentation	4	16	20	
			106	13.28%
Ask library staff				
Initiation	2	4	6	
Selection	2	3	5	
Exploration	3	2	5	
Formulation	1	1	2	
Collection	2	1	3	
Presentation	2	1	3	
			24	3.01%
Wold Wide Web				
Initiation	10	20	30	
Selection	8	15	23	
Exploration	10	20	30	
Formulation	9	17	26	
Collection	10	19	29	
Presentation	10	20	30	
			168	21.05%
Newspaper				
Initiation	6	2	8	
Selection	4	3	7	
Exploration	3	5	8	
Formulation	2	4	6	
Collection	2	5	7	
Presentation	6	6	12	
			48	6.01%
			798	

Universiti Malaya

Course		Biotechnology (Total = 2 students)	Science and Technology (Total = 4 students)	Total	Percentage (%)
Section A *Demographic* 1) Enrollment status	Full-time undergraduate	2	4	6	100%
	Part-time undergraduate	0	0	0	0%
2) Marital status	Single	2	4	6	100%
	Married	0	0	0	0%
Section B *Infrastructure* 1) Internet status	Available	2	4	6	100%
	Not available	0	0	0	0%
2) e-Learning access	Hostel	2	4	6	100%
3)Difficulties encountered	Poor internet connection	2	4	6	100%
	Too much information to scan	0	0	0	0.00%
	Specific information not available	0	0	0	0.00%
Section C *Information Sources and Channels* 1) Looking for information for subjects taken	Weekly	1	3	4	66.67%
	Daily	1	1	2	33.33%
2) Preferred information					

(The lowest value is the most preferred information)	Government information	16	32	48	
	Current issues	2	6	8	
	Technical information	14	28	42	
	Medical information	12	24	36	
	Leisure information	6	12	18	
	Sports information	16	32	48	
	Social information	8	16	24	
	Economic/Business Information	10	20	30	
	Science Information	4	8	12	
	Others	0	0	0	
3) Hours spend looking for information	0-5	1	3	4	66.67%
	6-10	1	1	2	33.33%
	11-15	0	0	0	0%
	16-20	0	0	0	0%
	>21	0	0	0	0%
4) Preferred information sources	World Wide Web	2	4	6	100%
	Library books	2	4	6	100%
	Handout from lecturer	2	4	6	100%
	Textbooks assigned to the course	2	2	4	66.67%
	Online database	0	0	0	0%
5) Favourite search engine	Google	2	4	6	100%

6) Software used to assist study	Moodle				
	Instant Messenger	0	0	0	0%
Section D *Course Management System/e-Learning* 1) About e-Learning	Normal	1	3	4	66.67%
	Very boring	1	1	2	33.33%
2) Preferred section	Course page	2	4	6	100%
	Others	1	0	1	17%
3) Feature can support two-way communication	Forum	2	4	6	100%
	Instant Messaging	0	0	0	0%
	Email	0	0	0	0%
4) The time when e-Learning become so useful	When to download lecture notes	2	4	6	100%
	When to look for announcement	0	0	0	0%
5) Expectation from e-Learning	To get lecture notes	2	4	6	100.00%
	Can become more interactive	0	0	0	0.00%
Section E *Motivation and Satisfactory Level*					

1) The importance of the following information resources	***Textbook***				
	Initiation	3	8	11	
	Selection	4	12	16	
	Exploration	5	14	19	
	Formulation	3	12	15	
	Collection	6	8	14	
	Presentation	10	5	15	
				90	13.02%
	Lecture notes				
	Initiation	10	12	22	
	Selection	8	13	21	
	Exploration	7	13	20	
	Formulation	8	12	20	
	Collection	9	16	25	
	Presentation	7	15	22	
				130	18.81%
	Online database				
	Initiation	1	8	9	
	Selection	2	9	11	
	Exploration	3	7	10	
	Formulation	2	9	11	
	Collection	3	6	9	
	Presentation	4	7	11	
				61	8.83%
	Library books				
	Initiation	3	9	12	
	Selection	4	8	12	
	Exploration	2	5	7	
	Formulation	3	7	10	
	Collection	4	6	10	
	Presentation	5	5	10	
				61	8.83%

Journal articles				
Initiation	4	6	10	
Selection	5	7	12	
Exploration	6	8	14	
Formulation	4	7	11	
Collection	5	9	14	
Presentation	6	7	13	
			74	10.71%
Ask library staff				
Initiation	1	7	8	
Selection	2	5	7	
Exploration	1	6	7	
Formulation	2	5	7	
Collection	3	4	7	
Presentation	2	3	5	
			41	5.93%
Wold Wide Web				
Initiation	10	20	30	
Selection	10	20	30	
Exploration	10	18	28	
Formulation	10	19	29	
Collection	10	19	29	
Presentation	10	20	30	
			176	25.47%
Newspaper				
Initiation	3	8	11	
Selection	2	6	8	
Exploration	1	9	10	
Formulation	3	8	11	
Collection	4	7	11	
Presentation	2	5	7	
			58	8.39%
			691	

Open University Malaysia (Distance learner)

Course		Business and Management (Total = 5)	Total	Percentage (%)
Section A *Demographic* 1) Enrollment status	Full-time postgraduate	0	0	0%
	Part-time postgraduate	5	5	100%
2) Marital status	Single	3	3	60%
	Married	2	2	40%
Section B *Infrastructure* 1) Internet status	Available	5	5	100%
	Not available	0	0	0%
2) internet access	Hostel	0	0	0%
	Own home	5	5	100%
3)Difficulties encountered	Poor internet connection	0	0	0%
	Too much information to scan	0	0	0.00%
	Specific information not available	5	5	100.00%
Section C *Information Sources and Channels* 1) Looking for information for subjects taken	Weekly	4	4	80.00%
	Daily	1	1	20.00%
2) Preferred information (The lowest value is the most				

preferred information)	Government information	5		
	Current issues	15		
	Technical information	21		
	Medical information	45		
	Leisure information	25		
	Sports information	10		
	Social information	20		
	Economic/Business Information	30		
	Science Information	40		
	Others	40		
3) Hours spend looking for information	0-5	2	2	40.00%
	6-10	3	3	60.00%
	11-15	0	0	0%
	16-20	0	0	0%
	>21	0	0	0%
4) Preferred information sources	World Wide Web	5		
	Library books	4		
	Handout from lecturer	2		
	Textbooks assigned to the course	0		
	Online database	0		
5) Favourite search engine	Google	5	5	100%

	Yahoo	0	0	0%
6) Software used to assist study	Moodle	0	0	0%
	Instant Messenger	5	5	100%